

## The Trophoninae (Gastropoda: Muricidae) of the New Caledonia region

*Roland HOUART*

3400 Landen (Ezemaal) Belgium  
Research Associate  
at the Institut Royal des Sciences Naturelles de Belgique

### ABSTRACT

New Caledonian representatives of the muricid subfamily Trophoninae are revised. Two new genera are described and a total of 32 species are recorded, of which 24 are new to science. One species is referred to *Apixystus* Iredale, 1929, four to *Trophonopsis* Bucquoy & Dautzenberg, 1882, twenty-two to *Leptotrophon* n. gen., four to *Conchatalos* n. gen., and one to *Litozamia* Iredale, 1929. Two species formerly described in *Poirieria* (*Paziella*) (Muricinae) are transferred to Trophoninae. Three species are also known from SE and E Australia, and/or from Indonesia. The others are known only from the New Caledonian region. Most species live between 250 and 775 meters; only one species occurs in 105-110 m and three range deeper than 1000 m.

### RÉSUMÉ

#### Les Trophoninae (Gastropoda: Muricidae) de la région néo-calédonienne.

Une faune très particulière de Trophoninae a été découverte lors des différentes campagnes de dragages dans la région néo-calédonienne. L'étonnante diversité de forme et de sculpture de la coquille est actuellement sans équivalent dans les autres régions du monde. La morphologie de la coquille et de la radula, par comparaison avec les espèces connues, ont conduit à la création des deux nouveaux genres *Leptotrophon* gen. nov. et *Conchatalos* gen. nov. Le premier genre groupe 22 espèces, dont deux décrites auparavant (HOUART, 1986) comme *Poirieria* (*Paziella*) (Muricinae). Le deuxième genre comprend quatre espèces, dont deux nommées auparavant comme *Trophon* (HOUART, 1991). Quatre espèces sont comprises dans *Trophonopsis* Bucquoy & Dautzenberg, 1882, une dans *Litozamia* Iredale, 1929 et une dans *Apixystus* Iredale, 1929. Vingt-quatre des 32 espèces recensées sont décrites comme nouvelles. Trois espèces sont connues également d'Australie et/ou d'Indonésie, les autres proviennent uniquement de la région néo-calédonienne. La plupart des espèces vivent entre 250 et 775 m de profondeur ; une espèce a été récoltée à 105-110 m et trois à plus de 1000 m de profondeur.

## INTRODUCTION

The subfamily Trophoninae has never been studied thoroughly so far, except in some local faunistic reports and revisions. The exact number of Recent species referable to the subfamily is unknown, but it is estimated here to be 210-215, including the new species described below.

Trophoninae is here used in a traditional way, to include typical "Trophon-like" species. However, in a recent paper, KOOL (1993), demonstrated that *Trophon geversianus* (Pallas, 1774), the type species of Trophoninae, is closely related to *Nucella* and *Ocenebra*. He concluded that future studies may show that Trophoninae is not a monophyletic group and that a new name for its members may be warranted. It is thus likely that all of the species included in the present paper will eventually have to be transferred from the Trophoninae to another subfamily.

Thanks to Dr Philippe BOUCHET (MNHN), I have the opportunity to examine material of the family Muricidae collected in the New Caledonian region during several deep-sea cruises, and I now have the privilege of recording a total of 32 species of Trophoninae, including 24 new species. There are a further 8 specimens, representing 6 or 7 unidentified species, in the material. They are not included here because of a need of additional material, or because the specimens are damaged or juveniles known from a single specimen. Six species have already been described from New Caledonia (HOUART, 1986, 1990, 1991). Two of them were originally included in the subfamily Muricinae due to resemblances of the shells to those of species of *Paziella* Jousseaume, 1880. Their radula, unknown to me at that time, proves to be trophonine, while additional material was most useful and decisive for the present classification. Two other previously described species that have not yet been recorded from New Caledonia are here included: *Trophon plicifalvatus* Verco, 1909, and *Trophon obtusefibratus* Schepman, 1911.

When I started working on the present material, I was astonished of the number of specimens of the species I had previously (HOUART, 1986) believed to belong to *Paziella*, which in 1986 were known only from 4 specimens in New Caledonia. After a more careful examination I recognized not only additional specimens of the hitherto known species, but also a considerable number of additional taxa, mostly from the north or the south of New Caledonia, but also off the Loyalty Islands and the Chesterfield Reefs. Finally I separated the whole group into 22 species: 20 new species here described plus *Paziella spinacutus* Houart, 1986 and *Paziella acerapex* Houart, 1986. The species are distinctive in their small size, and in the remarkable stability of the shape of the aperture (see descriptions) and radular morphology. Study of the radula also permits separation of the species from *Paziella*, in which the radula is quite different (RADWIN & D'ATTILIO, 1976: 86, fig. 50 and HARASEWYCH, 1984: 18, fig. 27). The species were compared with others included in a variety of genera, such as *Anatrophon*, *Apixystus*, *Benthoxystus*, and *Gemixystus* (all of Iredale, 1929), *Comptella* Finlay, 1927, *Xyruene* Iredale, 1915, and *Trophonopsis* Bucquoy & Dautzenberg, 1882.

Four other species, 2 of which (HOUART, 1991) were originally referred to *Trophon* Montfort, 1810, and 2 new species described herein, are grouped in a new genus.

Some of the species included in the new genera appear to have very restricted distributions, while others are widely distributed in the study area. Thirteen are known only from southern New Caledonia, 6 in the northern region, 2 from Chesterfield Reefs, and 5 from two or more geographical areas.

Some species have been collected in close proximity but at different depths and have not been proven to occur sympatrically. However, 20 species are sympatric with one or several other species, 17 hauls containing combinations of 2-4 different species (Table 1).

Except for one or two shells, it is also remarkable to observe the almost total lack of intraspecific variability, even for species with wide distributions.

TABLE 1. — Sympatric occurrence species of *Leptotrophon* and *Conchatalos* by cruise and station.

BIOCAL	
stn DW 08	<i>L. caledonicus</i> , <i>L. surprisensis</i>
stn DW 33	<i>L. charcoti</i> , <i>C. tirardi</i>
stn DW 38	<i>L. acerapex</i> , <i>L. inaequalis</i>
stn DW 44	<i>L. acerapex</i> , <i>L. carroae</i> , <i>C. lacrima</i>
stn DW 46	<i>L. carroae</i> , <i>L. surprisensis</i>
stn DW 48	<i>L. spinacutus</i> , <i>L. charcoti</i>
LAGON	
stn 444	<i>L. surprisensis</i> , <i>L. protocarinatus</i>
MUSORSTOM 4	
stn DW 156	<i>L. lineorugosus</i> , <i>L. rigidus</i>
stn DW 161	<i>L. lineorugosus</i> , <i>L. richeri</i>
stn DW 162	<i>L. surprisensis</i> , <i>L. marshalli</i>
stn DW 164	<i>L. caledonicus</i> , <i>L. virginiae</i> , <i>L. mitispinosus</i>
stn DW 196	<i>L. surprisensis</i> , <i>L. marshalli</i>
stn DW 197	<i>L. lineorugosus</i> , <i>L. surprisensis</i>
stn DW 220	<i>L. bernadettae</i> , <i>C. tirardi</i>
stn DW 221	<i>L. bernadettae</i> , <i>L. charcoti</i> , <i>C. tirardi</i>
stn DW 222	<i>L. spinacutus</i> , <i>L. acerapex</i> , <i>L. bernadettae</i> , <i>C. vaubani</i>
CHALCAL 2	
stn DW 76	<i>L. metivieri</i> , <i>C. canalibrevis</i>

## ABBREVIATIONS AND TEXT CONVENTIONS

The present study is based on material collected during numerous cruises in the New Caledonian region. For narratives of the cruises and complete stations lists, see RICHER DE FORGES (1990, 1991).

*Descriptions.* All undoubtedly adult specimens have 5 or more teleoconch whorls, which is usual in species of Trophoninae. The operculum is almost identical in all species, thin and unguiculate, with a subterminal nucleus (Figs 30 to 35).

*Remarks.* The remarks are almost entirely devoted to the geographical distribution and sympatry of species. All the species are contrasted in Tables 2 and 3.

*Repositories*

AMS	: Australian Museum, Sydney
MNHN	: Muséum national d'Histoire naturelle, Paris
NMNZ	: Museum of New Zealand, Wellington
NMP	: Natal Museum, Pietermaritzburg
NSMT	: National Science Museum, Tokyo
RII	: Author's collection, Landen
SAM	: South Australian Museum, Adelaide
USNM	: National Museum of Natural History, Washington, DC
ZMA	: Zoölogisch Museum, Amsterdam

*Station data*

- CC : Chalut à crevettes (Shrimp trawl)  
 CP : Chalut à perche (Beam trawl)  
 DC : Drague Charcot (Charcot dredge)  
 DE : Drague Epibenthique (Epibenthic dredge)  
 DW : Drague Warén (Warén dredge)

*Other abbreviations*

- lv : live-taken specimen(s) present in sample  
 dd : only empty shell(s) present in sample  
 OD : Original designation.

## SYSTEMATIC ACCOUNT

Family MURICIDAE Rafinesque, 1815

Subfamily TROPHONINAE Cossmann, 1903

Genus *TROPHONOPSIS* Bucquoy & Dautzenberg, 1882

Genus *Trophonopsis* Bucquoy & Dautzenberg in Bucquoy, Dautzenberg & Dollfus, 1882: 40. Type species (OD): *Murex muricatus* Montagu, 1803; Recent, Europe.

*Trophonopsis plicilaminatus* (Verco, 1909)

Figs 37-39

*Trophonopsis plicilaminatus* Verco, 1909: 335, pl. 24, figs 1-2.

TYPE MATERIAL. — Holotype SAM D13486. Paratype AMS C31093.

TYPE LOCALITY. — Off Beachport, South Australia, 365-274 m.

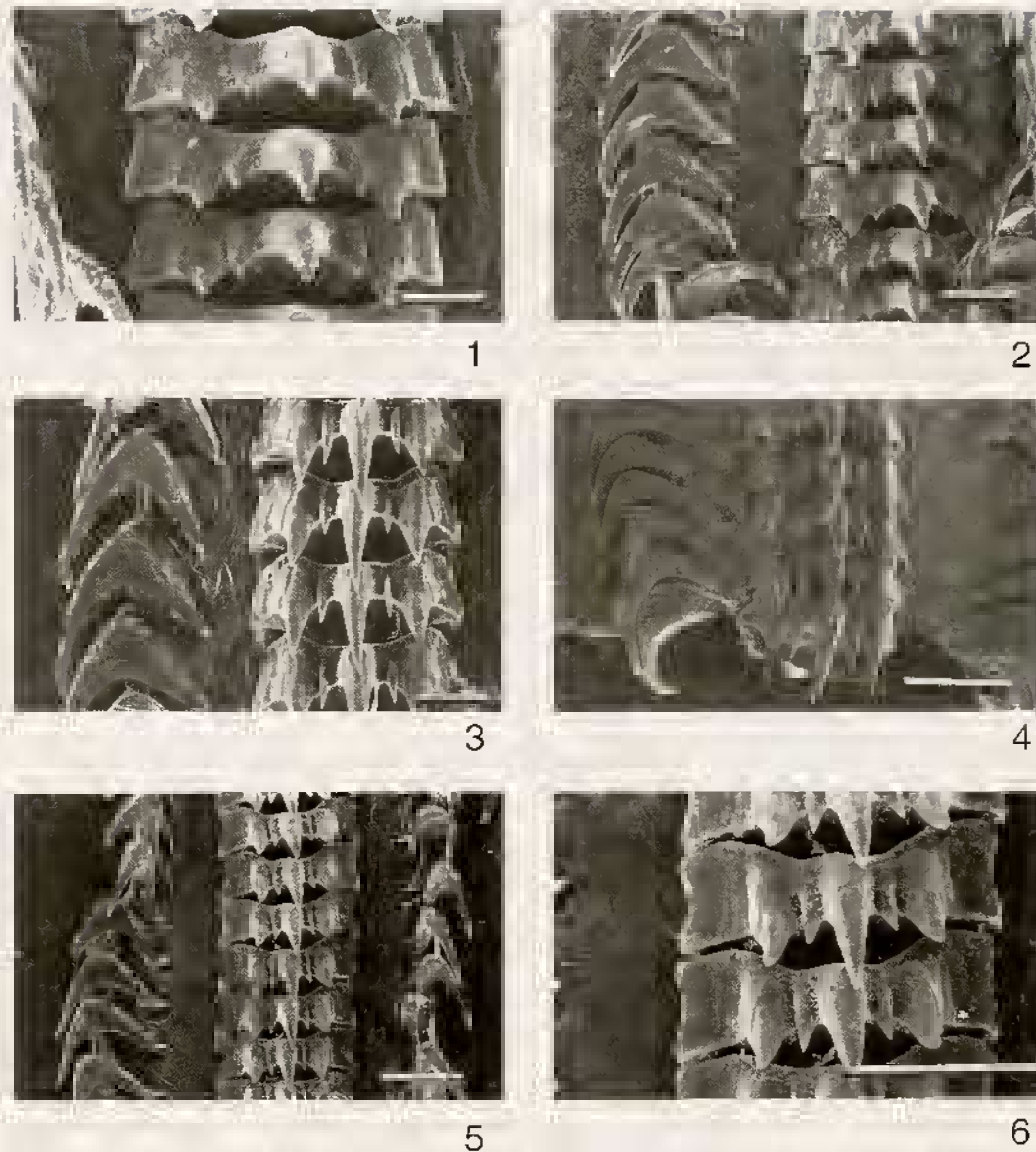
MATERIAL EXAMINED. — The type material.

**New Caledonia.** BIOCAL: stn DW 33, 23°10' S, 167°10' E, 675 m, 1 dd. — Stn CP 57, 23°43' S, 167°59' E, 1490 m, 2 dd. — Stn CP 61, 24°12' S, 167°31' E, 1070 m, 4 dd. — Stn DW 70, 23°25' S, 167°54' E, 965 m, 4 dd.

**Coral Sea.** MUSORSTOM 5: stn DW 322, 21°19' S, 158°00' E, 975 m, 5 dd.

DISTRIBUTION. — South Australia (Beachport), in 274-365 m (recorded alive), the Coral Sea, and southern New Caledonia, in 675-1490 m (empty shells).

REMARKS. — Hitherto known only from off Beachport, South Australia in 274-365 m. Only empty shells have been recorded from the New Caledonian region, so that no bathymetric range for living specimens can be given for the Coral Sea and New Caledonia.



FIGS 1-6. — Radulae of Trophoninae. — 1, *Boreotrophon clathratus* (Linné, 1767), Iceland. Scale line 20  $\mu$ m. — 2, *B. clathratus*, Iceland. Scale line 30  $\mu$ m. — 3, *B. acceptans* (Barnard, 1959), S. Africa. Scale line 30  $\mu$ m. — 4, *Trophonopsis muricatus* (Montagu, 1803), Italy. Scale line 20  $\mu$ m. — 5-6, *T. multigradus*, New Caledonia. Scale line 50  $\mu$ m.

*Trophonopsis obtuseliratus* (Schepman, 1911)

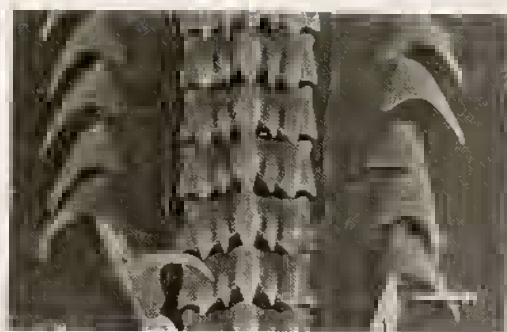
Figs 40-41

*Trophon obtuseliratus* Schepman, 1911: 338, pl. 21, fig. 1; pl. 24, fig. 5.

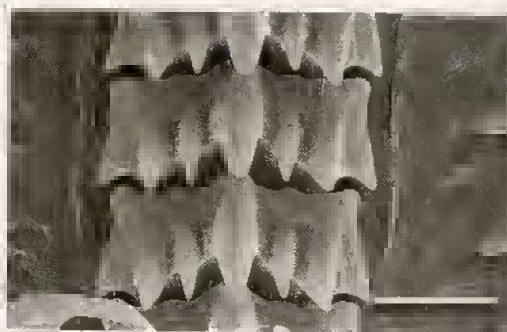
TYPE MATERIAL. — Holotype ZMA 3.11.075.

TYPE LOCALITY. — Flores Sea, "Siboga", stn 45, 07°24' S, 118°15' E, 794 m.

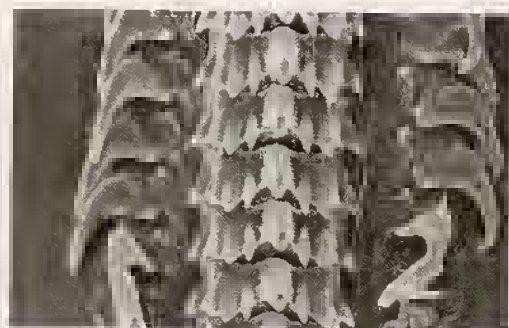




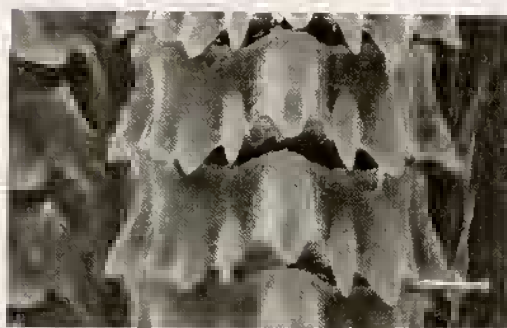
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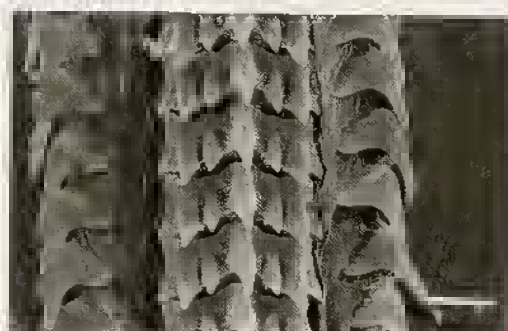
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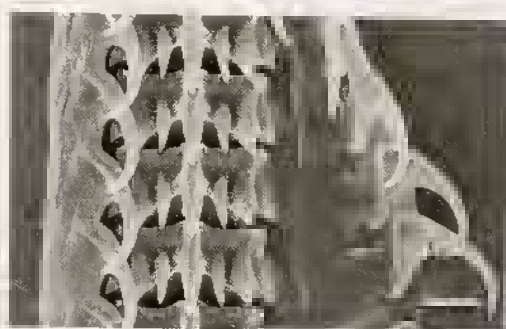
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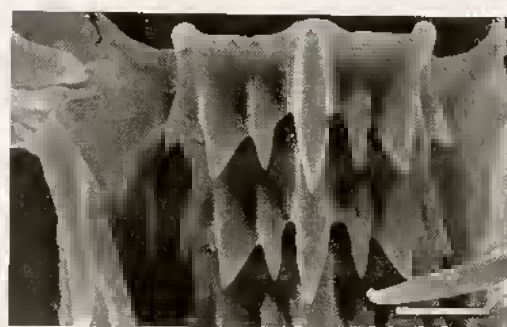
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Figs 7-14. — Radulae of *Leptotrophon*. — 7-8, *L. carcae*. — 9-10, *L. acerapex*. — 11-12, *L. levii*. — 13-14, *L. bernadettae*.  
Scale lines 10  $\mu$ m.

MATERIAL EXAMINED. — The type material.

**Loyalty Basin.** BIOGEOCAL: stn CP 260, 21°00' S, 167°58' E, 1820-1980 m, 2 lv.

**Australia.** Off Sydney, NSW, 512 m, 1 lv (RH).

DISTRIBUTION. — Indonesia (Flores, Savu, Banda and Arafura Seas); SE Australia, 420-988 m (COCHRAN, 1985) and the Loyalty Islands, from 1820 to 1980 m (recorded alive).

*Trophonopsis minirotundus* (Houart, 1986)

Figs 42-43

*Trophon* (*Trophonopsis*) *minirotundus* Houart, 1986: 438, pl. 1, figs 4-4A-B.

TYPE MATERIAL. — Holotype MNHN.

TYPE LOCALITY. — New Caledonia, "Vauban" 1978-79, stn 40, 22°30' S, 166°24' E, 250-350 m.

DISTRIBUTION. — Off southwestern New Caledonia, 250-350 m (dead recorded).

REMARKS. — Known only from the holotype, which has only 3 teleoconch whorls and is probably a juvenile. Dredgings have been made in the same area during the BIOCAL cruise but at 1550-2080 m, which is probably much too deep for *T. minirotundus* (250-350 m). Dredgings during the "programme LAGON" have also been made in that particular area, but not deeper than 80 meters.

*Trophonopsis multigradus* (Houart, 1990)

Figs 5-6, 36, 139-140

*Trophon multigradus* Houart, 1990: 212, figs 13, 18-19, 24-25.

TYPE MATERIAL. — Holotype MNHN. Paratypes: 1 MNHN, 1 AMS C161951, 1 NMNZ MF49874, 1 RII.

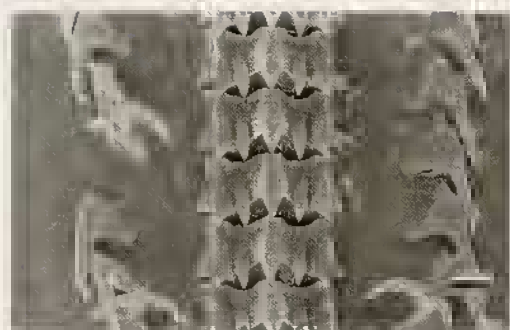
TYPE LOCALITY. — New Caledonia, MUSORSTOM 4, stn CC 177, 18°55' S, 163°10' E, 540-600 m.

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL: stn DW 48, 23°00' S, 167°29' E, 775 m, 10 dd. — Stn DW 49, 23°03' S, 167°32' E, 825-830 m, 2 dd. — Stn DW 53, 23°09' S, 167°43' E, 975-1005 m, 1 dd.

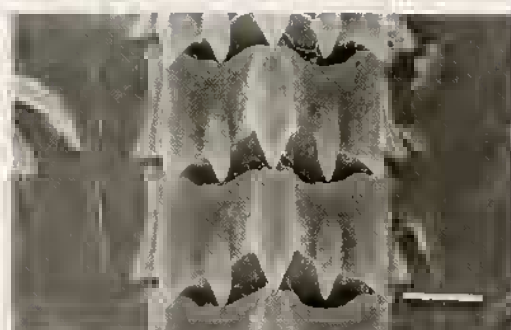
MUSORSTOM 4: stn CP 169, 18°54' S, 163°11' E, 590 m, 2 dd (paratypes: 1 AMS, 1 NMNZ). — Stn CC 177, 18°55' S, 163°10' E, 540-600 m, 1 dd (holotype MNHN). — Stn DW 197, 18°51' S, 163°21' E, 550 m, 1 dd (paratype MNHN). — Stn CP 199, 18°50' S, 163°14' E, 595 m, 1 dd (paratype RH).

DISTRIBUTION. — Northern and southern New Caledonia, 540-1005 m. Bathymetric range for live-taken material 540-600 m.

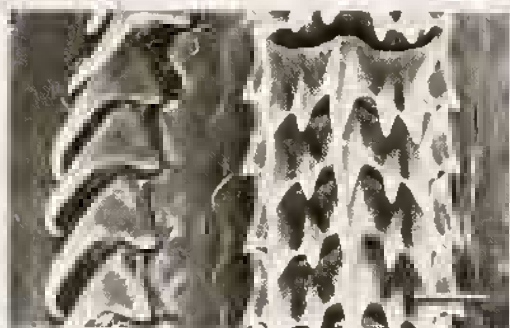
REMARKS. — When originally described, this species was compared with *Trophon obtuseliratus* Schepman, 1911, which has fewer axial lamellae, fewer and weaker spiral cords, and a relatively longer siphonal canal. *T. pulchellus* Schepman, 1911 has fewer, more strongly developed axial lamellae, a more lightly built and more narrowly fusiform shell, and more weakly shouldered whorls. *T. soyuae* (Okutani, 1959), a superficially similar abyssal species from Japan, has a thin, delicate shell, the last whorl having approximately 80 thin axial lamellae and 2 weak spiral cords.



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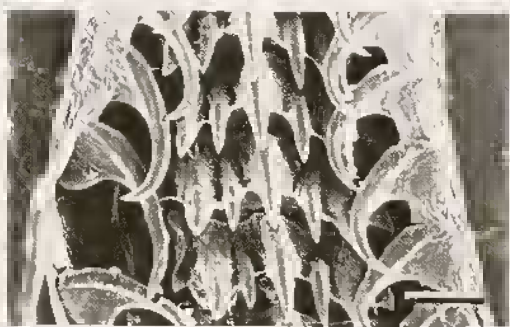
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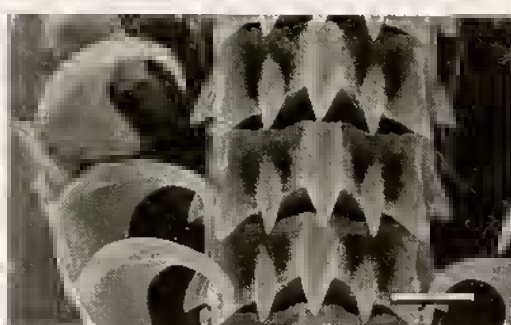
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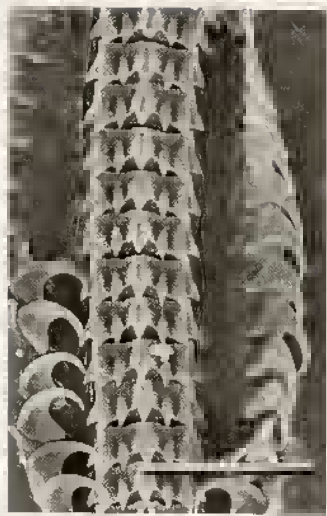
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Figs 15-22. — Radulae of *Leptotrophon*. — 15-16, *L. lineorugosus*. — 17-18, *L. coriolis*. — 19-20, *L. caledonicus*. — 21, *L. protocarيناتus*. — 22, *L. surprisensis*. Scale lines 10  $\mu$ m.





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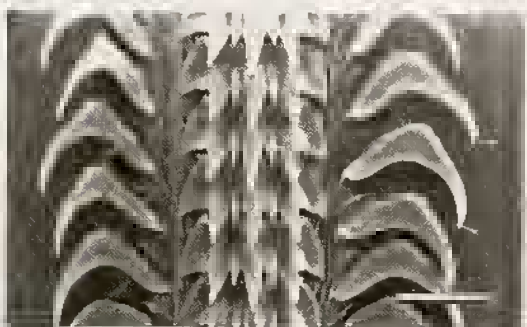
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FIGS 23-29. — Radulae of *Leptotrophon*, *Conchatalos* and *Apixystus*. — 23, *Leptotrophon surprisensis*. — 24, *L. charcoti*. — 25, *Conchatalos lacrima*. — 26, *C. tirardi*. — 27, *C. vaubani*. — 28-29, *Apixystus leptos*. — 23, scale line 50  $\mu$ m; 24-29, scale lines 10  $\mu$ m.



FIGS 30-35. — Opercula of *Leptotrophon* and *Conchatalos*. — 30, *Leptotrophon caroae*, height 1.6 mm. — 31, *L. bernadettae*, height 2.6 mm. — 32, *L. lineorugosus*, height 2.5 mm. — 33, *L. surprisensis*, height 2.1 mm. — 34, *L. protocarinatus*, height 2.3 mm. — 35, *Conchatalos lacrima*, height 2.6 mm.

#### Genus *LEPTOTROPHON* gen. nov.

Type species: *Leptotrophon caroae* sp. nov. Recent, New Caledonia, Loyalty Ridge, Coral Sea.

**DIAGNOSIS.** — *Shell* biconical, up to 13.5 mm in length, average length 8-10 mm. Last *teleoconch* whorl with 6-10 axial, lamellate, or occasionally rounded varices. Aperture roundly-ovate with flaring columellar lip and erect outer lip. Siphonal canal straight or occasionally weakly bent, spineless, open. Lateral teeth of *radula* sickle-shaped; rachidian tooth with medium to long, lenticular central cusp, lateral denticles and lateral cusps medium-sized, marginal cusps short to medium-sized. Cusps and denticles all well separated from each other.

**REMARKS.** — The species of *Leptotrophon* differ from those of *Trophonopsis* in being generally smaller and more delicate, while the flaring columellar lip is another distinctive character. The radula

has a broader base and the rachidian tooth usually has more strongly projecting cusps and denticles (see Figs 1-6 for comparison). Specific characters are compared in Table 2.

ETYMOLOGY. — From *Leptos* (Greek): thin, and *Trophon* (type-genus of the subfamily Trophoninae).

*Leptotrophon acerapex* (Houart, 1986)

Figs 9-10, 46, 98-99

*Poirieria (Paziella) acerapex* Houart, 1986: 437, pl. 1, figs 2.2A.

TYPE MATERIAL. — Holotype MNHN.

TYPE LOCALITY. — New Caledonia, "Vauban" 1978-79, stn 16, 22°46' S, 167°12' E, 390-400 m.

MATERIAL EXAMINED. — New Caledonia. "Vauban" 1978-79: stn 16, 22°46' S, 167°12' E, 390-400 m (holotype MNHN).

BIOCAL: stn DW 37, 23°00' S, 167°16' E, 350 m, 5 dd. — Stn DW 38, 23°00' S, 167°15' E, 360 m, 2 dd. — Stn DW 44, 22°47' S, 167°14' E, 440-450 m, 4 lv.

MUSORSTOM 4: stn DW 222, 22°58' S, 167°33' E, 410-440 m, 2 lv, 1 dd. — Stn DW 227, 22°46' S, 167°20' E, 320 m, 1 lv. — Stn unknown, 2 dd.

SMIB 2: stn DW 08, 22°54' S, 167°13' E, 435-447 m, 1 dd.

SMIB 4: stn DW 66, 22°56' S, 167°15' E, 400-430 m, 1 lv.

DISTRIBUTION. — Southern New Caledonia, 320-450 m. Bathymetric range for live-taken material 400-450 m.

DESCRIPTION. — *Shell* medium sized, up to 12.5 mm in length at maturity, stout, spinose. Spire very high, acute, with 1.5 protoconch whorls and up to 5 broad, weakly shouldered teleoconch whorls. *Protoconch* smooth, glossy, acuminate; terminal varix low, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of low, spinose varices. First teleoconch whorl with 8 varices, second with 7 or 8, third and fourth with 7, last whorl with 6 varices bearing 3 medium-sized, acute spines. Other axial sculpture consisting of

numerous growth striae. Spiral sculpture of low cords: first to fourth whorls with 1 carinal cord, last whorl with 3 cords, abapically with 1 or 2, low, weak secondary cords. Aperture roundly-ovate. Columellar lip flaring, smooth, rim partially erect, adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth. Siphonal canal medium sized, straight, smooth. White. Rachidian *radular tooth* with medium sized cusps and denticles; lateral tooth sickle shaped with broad base.

REMARKS. — *Leptotrophon acerapex* lives in a restricted geographical area. Sympatric species are *L. spinacutus*, *L. cavae*, *L. bernadettae*, *L. inaequalis*, *Couchatalos vaubani* and *C. lacrima*.

*Leptotrophon spinacutus* (Houart, 1986)

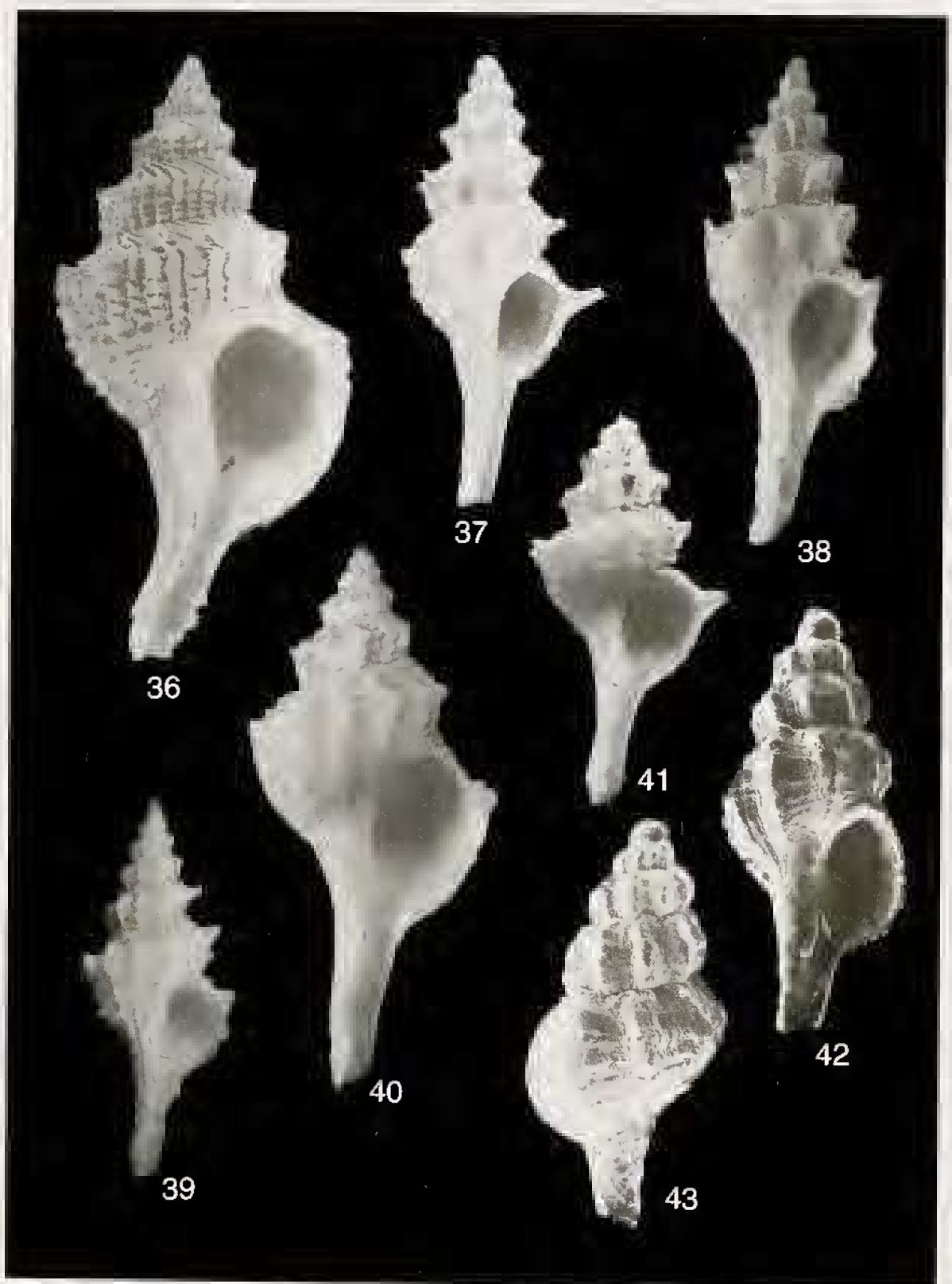
Figs 45, 95-96

*Poirieria (Paziella) spinacutus* Houart, 1986: 437, pl. 1, figs 3. 3A-B.

TYPE MATERIAL. — Holotype MNHN. Paratypes: 1 AMS C140734, 1 NMNZ MF34197, 1 RH.

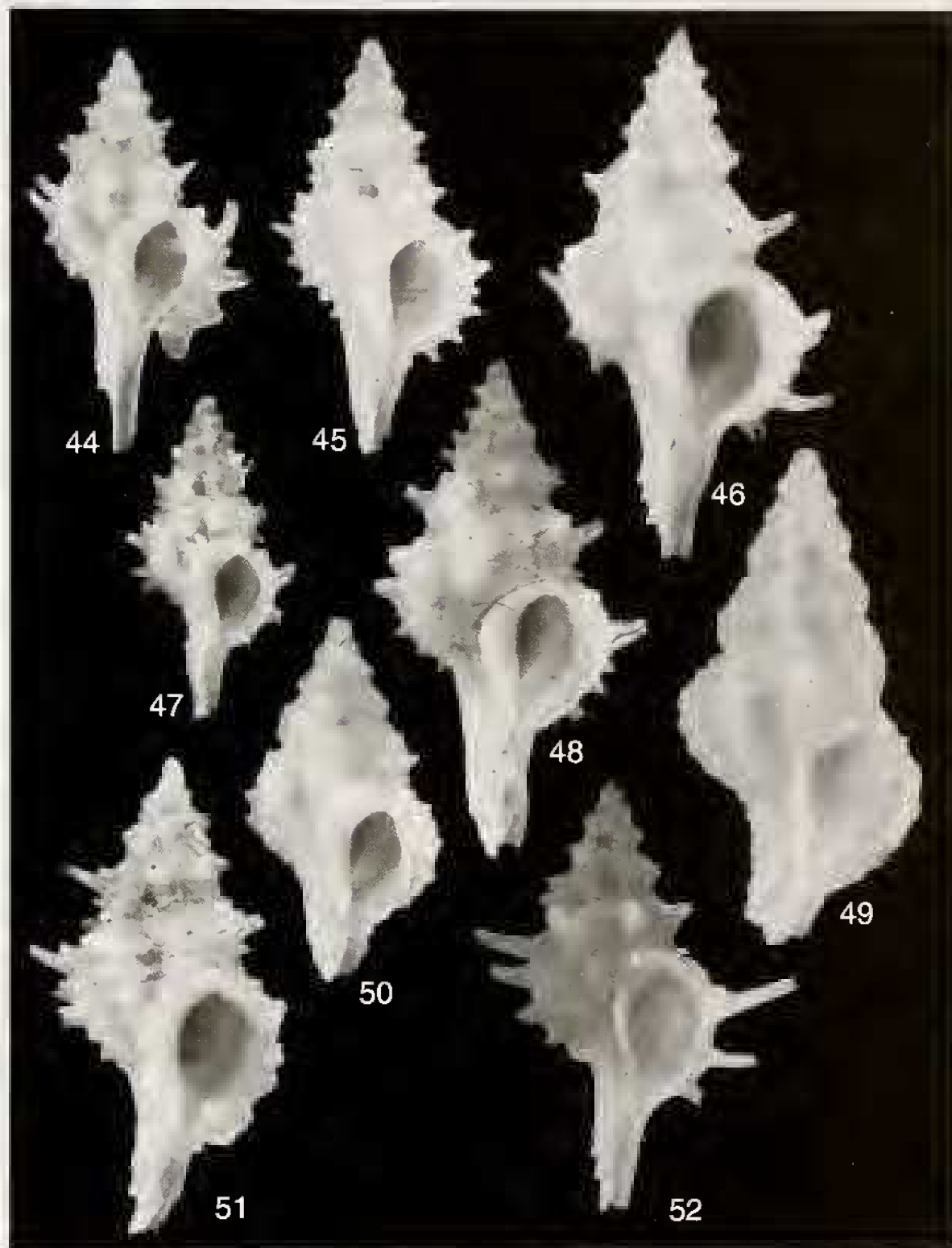
TYPE LOCALITY. — New Caledonia, "Vauban" 1978-79, stn 40, 22°30' S, 166°24' E, 250-350 m.

MATERIAL EXAMINED. — New Caledonia. "Vauban" 1978-79: stn 2 (not station 1 as originally noted), 22°17' S, 167°14' E, 425-430 m, 1 dd (paratype RH). — Stn 3, 22°17' S, 167°12' E, 390 m, 2 dd (paratypes: 1 AMS, 1 NMNZ). — Stn 40, 22°30' S, 166°24' E, 250-350 m, 1 dd (holotype MNHN).



FIGS 36-43.-Genus *Trophonopsis*. — 36, *Trophonopsis multigradus*, holotype, 27.5 mm. — 37-39, *T. plicilaminatus*. — 37, MUSORSTOM 5: stn 322, 10 mm. — 38, paratype AMS C32001, 15.9 mm. — 39, holotype SAM D13486, 14.4 mm. — 40-41, *T. obtusehratus*. — 40, holotype ZMA 3.11.075, 32 mm. — 41, BIOGEOCAL: stn CP 260, 13.5 mm. — 42-43, *T. minirotundus*, holotype, 5 mm.





FIGS 44-52. — Genus *Leptotrophon*. — 44, *Leptotrophon caroae* sp. nov., holotype, 9.1 mm. — 45, *L. spinacutus*, MUSORSTOM 4; stn DW 226, 11 mm. — 46, *L. acerapex*, BIOCAL; stn DW 44, 12.5 mm. — 47, *L. levii* sp. nov., holotype, 7 mm. — 48, *L. rigidus* sp. nov., holotype, 11.5 mm. — 49-50, *L. caledonicus* sp. nov. — 49, holotype, 12.2 mm. — 50, BIOCAL; stn DW 08, 8.5 mm. — 51, *L. bernadettae* sp. nov., holotype, 11 mm. — 52, *L. charcoti* sp. nov., holotype, 13 mm.

BIOCAL: stn DW 46, 22°53' S, 167°17' E, 570-610 m, 4 lv. — Stn DW 48, 23°00' S, 167°29' E, 775 m, 2 dd.

MUSORSTOM 4: stn DW 222, 22°58' S, 167°33' E, 410-440 m, 1 dd. — Stn DW 226, 22°47' S, 167°22' E, 390 m, 16 dd.

**Loyalty Ridge.** SMIB 5: stn DW 91, 22°18' S, 168°41' E, 340 m, 1 lv.

**DISTRIBUTION.** — New Caledonia, 340-610 m (recorded alive).

**DESCRIPTION.** — *Shell* up to 12 mm in length, heavy, spinose. Spire very high with 1.5 protoconch whorls and up to 5 weakly convex, spinose teleoconch whorls. *Protoconch* rounded, smooth, glossy; terminal varix low, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of rounded, spinose varices. First whorl with 8 or 9 varices, second to fourth whorl with 8 varices, last whorl with 7 varices bearing 5 or occasionally 6 short, open spines. Spiral sculpture consisting of rounded cords, 1 on first and second

whorl, 2 on third whorl; 3, including 1 on shoulder on fourth whorl; 5 or 6, including 1 on shoulder on last whorl; occasionally with secondary cords on last and penultimate whorls. Aperture ovate. Columellar lip flaring, smooth, rim partially erect, adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth. Siphonal canal medium sized, narrow, straight, narrowly open, with 4 or 5 low spiral cords. Whitish, with occasional brown blotches between spiral cords, especially on varices. *Radula* unknown.

**REMARKS.** — This species lives sympatrically with *L. acerapex*, *L. charcoti*, and *Conchatalos vanbani*.

*Leptotrophon caroae* sp. nov.

Figs 7-8, 30, 44, 91-92

**TYPE MATERIAL.** — Holotype MNHN. Paratypes: 213 MNHN, 2 AMS C301327, 2 NMNZ M262667, 2 NMP L1155, 2 USNM 860393, 2 RH.

**TYPE LOCALITY.** — New Caledonia, BIOCAL, stn DW 44, 22°47' S, 167°14' E, 440-450 m.

**MATERIAL EXAMINED.** — **New Caledonia.** BIOCAL: stn DW 44, 22°47' S, 167°14' E, 440-450 m, 223 lv & dd (holotype and paratypes). — Stn DW 46, 22°53' S, 167°17' E, 570-610 m, 18 lv & dd. MUSORSTOM 4: stn DW 230, 22°52' S, 167°12' E, 390-420 m, 1 lv.

**DISTRIBUTION.** — Off Southern New Caledonia, 390-610 m (recorded alive).

**DESCRIPTION.** — *Shell* up to 9.3 mm in length at maturity, spinose, lightly built. Spire high with 1.5 protoconch whorls and up to 5 shouldered teleoconch whorls. *Protoconch* whorls rounded, smooth, glossy; terminal varix low, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of thin, lamellate, somewhat spinose varices. First and second whorls with 8 varices, third whorl with 7 or 8 varices, fourth with 7 varices, last whorl with 6 or 7 varices with broad, thin, abapical webbing. Varices of last whorl with 4 medium-sized, weakly adaperturally bent, open spines. Shoulder spine longest. Other axial sculpture of numerous, delicate, fine

growth striae. Spiral sculpture consisting of weak, equal-sized, rounded cords: 1 on first whorl, 1 or 2 on second, 2 on third and fourth whorl, 5, including 1 on shoulder, on last whorl, carinal cord strongest. Aperture ovate. Columellar lip flaring, smooth, rim partially erect, weakly adherent at adapical extremity. Anal notch shallow, broad. Outer lip strongly erect, smooth. Siphonal canal long, narrow, straight, narrowly open, smooth. Translucent white. Rachidian *radular tooth* with medium sized cusps and denticles, lateral teeth sickle shaped with broad base.

**REMARKS.** — *Leptotrophon caroae* lives in a restricted area to the south of New Caledonia where it is sympatric with *L. acerapex*, *L. surprisensis* and *Conchatalos lacrima*. It differs from other species of *Leptotrophon* in its abapertural webbing.

**ETYMOLOGY.** — Named after my daughter Caroline (Caro), whose help is always welcome.

*Leptotrophon lineorugosus* sp. nov.

Figs 15-16, 32, 55, 102-103

TYPE MATERIAL. — Holotype MNHN. Paratypes: 6 MNHN, 1 NMNZ M262668, 1 RH.

TYPE LOCALITY. — New Caledonia, MUSORSTOM 4, stn DW 159, 18°46' S, 163°16' E, 585 m.

MATERIAL EXAMINED. — **Chesterfield Islands**, MUSORSTOM 5: stn DC 388, 20°45' S, 160°54' E, 500-510 m, 1 dd.

CORAIL 2: stn DE 16, 20°48' S, 160°56' E, 500 m, 1 lv.

**New Caledonia**, MUSORSTOM 4: stn DW 156, 18°54' S, 163°19' E, 525 m, 2 dd (paratypes). — Stn DW sin DW 159, 18°46' S, 163°16' E, 585 m, 1 lv (holotype), 4 lv & dd (paratypes: 2 MNHN, 1 NMNZ, 1 RH). — Stn DW 161, 18°39' S, 163°11' E, 550 m, 1 dd (paratype). — Stn DW 197, 18°51' S, 163°21' E, 550 m, 1 lv (paratype).

DISTRIBUTION. — Chesterfield Reefs and northern New Caledonia, 500-585 m (recorded alive).

DESCRIPTION. — *Shell* up to 10.9 mm in length, heavy. Spire high, with 1.5 protoconch whorls and up to 5 broadly convex, squamous teleoconch whorls. *Protoconch* whorls rounded, smooth, glossy; terminal varix low, delicate. *Teleoconch* suture weakly impressed. Axial sculpture consisting of strong, rounded, squamous, ribs. First to fourth whorls with 9 ribs. Last whorl with 7 or 8 ribs. Other axial sculpture of minutely squamous growth lirae. Spiral sculpture consisting of narrow, squamous cords: 3 on first whorl, 4 or 5 on second, 8 or 9 on third and fourth whorls, last whorl with 17-19 cords. Shoulder with 2-4 cords from second to last

whorl. Spiral cords intersecting growth lirae to produce a squamous appearance. Aperture ovate. Columellar lip flaring, smooth, occasionally with small node at middle, rim partially erect, adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth, weakly lirate within. Siphonal canal medium sized, narrow, straight, narrowly open, with some weak spiral cords adaperturally; abaperturally smooth. White. Rachidian *radular tooth* with medium sized-cusps and denticles. Lateral teeth sickle shaped with broad base.

REMARKS. — *Leptotrophon lineorugosus* lives sympatrically with *L. rigidus*, *L. surprisensis* and *L. richeri*.ETYMOLOGY. — From *linea* (Latin) = cord, and *rugosus* (Latin) = rugose.*Leptotrophon levii* sp. nov.

Figs 11-12, 47, 93-94

TYPE MATERIAL. — Holotype MNHN. Paratypes: 89 MNHN, 2 AMS C301328, 2 NMNZ M262669, 2 NMP L1156/T1191, 2 USNM 860394, 2 RH.

TYPE LOCALITY. — New Caledonia, CHALCAL 2, stn DW 72, 24°55' S, 168°22' E, 527 m.

MATERIAL EXAMINED. — **New Caledonia**, BIOCAL: stn DW 66, 24°55' S, 168°22' E, 505-515 m, 92 lv & dd (paratypes: 82 MNHN, 2 AMS, 2 NMNZ, 2 NMP, 2 USNM, 2 RH). SMIB 3: stn DW 01, 24°56' S, 168°22' E, 520 m, 3 lv.

CHALCAL 2: stn DW 72, 24°55' S, 168°22' E, 527 m, 1 lv (holotype), 7 lv &amp; dd (paratypes).

DISTRIBUTION. — Southern New Caledonia, 505-527 m (recorded alive).

DESCRIPTION. — *Shell* up to 7.9 mm in length, spinose, lightly built. Spire very high with 1.5 protoconch whorls and up to 5 narrowly convex, spinose teleoconch whorls. *Protoconch* whorls rounded, smooth, glossy; terminal varix low,

delicate. *Teleoconch* axial sculpture consisting of lamellose, spinose varices. First and second whorls with 8 varices, third whorl with 9 varices, fourth and last whorls with 8 or 9 varices. Spiral sculpture of very low cords, almost or

completely obsolete on last whorl, 2 cords on first to third whorl, 3 on fourth, including 1 on shoulder, 4 or 5 on last whorl, including 1 on shoulder. Cords ending as broadly open, somewhat blunt spines on varices. Aperture ovate. Columellar lip flaring, smooth, completely erect. Anal notch shallow, broad. Outer lip erect, smooth, with 1 small node

within abapically. Siphonal canal medium sized, narrow, weakly abaperturally bent, narrowly open, smooth except numerous axial growth striae. White or translucent white. Rachidian *radular tooth* with medium sized cusps and denticles. Lateral teeth sickle shaped, with broad base.

REMARKS. — A small species with which no similar species is known to be sympatric. *L. biocalae* occurs in the vicinity but at shallower depths.

ETYMOLOGY. — Named after Claude LÉVI, senior scientist of the BIOCAL cruise.

*Leptotrophon rigidus* sp. nov.

Figs 48, 100-101

TYPE MATERIAL. — Holotype MNHN. Paratypes: 12 MNHN, 1 AMS C301329, 1 NMNZ M262670, 1 NMP L1157/T1192, 1 RH.

TYPE LOCALITY. — New Caledonia, MUSORSTOM 4, stn CC 247, 22°09' S, 167°13' E, 435-460 m.

MATERIAL EXAMINED. — New Caledonia. MUSORSTOM 4: stn CC 246, 22°08' S, 167°11' E, 410-420 m, 3 dd. — Stn CC 247, 22°09' S, 167°13' E, 435-460 m, 1 lv (holotype), 2 dd (paratypes).

BIOCAL: stn DW 77, 22°15' S, 167°15' E, 440 m, 14 dd (paratypes: 10 MNHN, 1 AMS, 1 NMNZ, 1 NMP, 1 RH).

Loyalty Basin. BIOGEOCAL: stn DW 253, 21°32' S, 166°29' E, 310-315 m, 11 dd.

DISTRIBUTION. — Eastern and southeastern New Caledonia, 310-460 m. Bathymetric range for live-taken material 435-460 m.

DESCRIPTION. — *Shell* up to 13.5 mm in length, heavy, spinose. Spire high with 1.5 protoconch whorls and up to 5 shouldered, angulate, teleoconch whorls. *Protoconch* whorls rounded, weakly elongate, smooth; terminal varix low, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of spinose varices. First and second whorls with 7 or 8 varices, third and fourth whorls with 7 varices; last whorl with 6 varices, each with a long, narrowly open shoulder spine, followed abapically by 4 or 5 small, open spinelets. Earlier whorls with rather long shoulder spines. Spiral

sculpture of rounded cords. 2 on first to third whorls, 3 or 4 on fourth, including 1 or 2 low cords on shoulder, last whorl with one heavy carinal cord, and 4 or 5 smaller cords abapically; shoulder with 2 or 3 low cords. Aperture ovate. Columellar lip flaring, smooth but small, elongate node, almost in the middle of the lip. Anal notch shallow, broad. Outer lip erect, smooth, weakly lirate for short distance within. Siphonal canal long, narrow, straight, narrowly open, smooth. Translucent white. *Radula* unknown.

REMARKS. — *Leptotrophon rigidus* lives sympatrically with *L. lineorugosus* in southern New Caledonia only.

ETYMOLOGY. — *Rigidus* (Latin) = stiff.

*Leptotrophon bernadettae* sp. nov.

Figs 13-14, 31, 51, 104-105

TYPE MATERIAL. — Holotype MNHN. Paratypes: 14 MNHN, 1 AMS C301330, 1 NMNZ M262671, 1 NMP L1158/T1193, 1 RH.



TYPE LOCALITY. — New Caledonia, MUSORSTOM 4, stn DW 221, 22°59' S, 167°37' E, 535-560 m.

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4: stn DW 220, 22°58' S, 167°38' E, 505-550 m, 7 lv & dd (paratypes: 3 MNHN, 1 AMS, 1 NMNZ, 1 NMP, 1 RH). — Stn DW 221, 22°59' S, 167°37' E, 535-560 m, 1 lv (holotype) and 10 lv & dd (paratypes). — Stn DW 222, 22°58' S, 167°33' E, 410-440 m, 1 lv (paratype).

DISTRIBUTION. — Southern New Caledonia, 410-560 m (recorded alive).

DESCRIPTION. — *Shell* up to 12 mm in length at maturity, spinose, lightly built. Spire high with 1.5-1.75 protoconch whorls and up to 5 convex, spinose, teleoconch whorls. *Protoconch* acute, whorls smooth, glossy; terminal varix low, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of spinose varices. First whorl with 7 varices, second with 8, third whorl with 8 or 9, fourth with 9 or 10, last whorl with 8-10 varices. Varices of last whorl with a long, open, shoulder spine, abapically followed by 4 smaller, open spinelets. Spiral sculpture consisting of rounded, squamous

cords; 2 cords from first to third whorl, 3 on fourth whorl, 5, including 2 or 3 weak cords on shoulder, on last whorl. Aperture ovate. Columellar lip flaring, smooth, lip almost completely erect, weakly adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth, a small node within at abapical extremity. Siphonal canal medium sized, narrow, straight or weakly abaperturally bent, narrowly open, smooth. Translucent white. Rachidian *radular tooth* with long, elongate, central cusp and medium-sized lateral denticles and marginal cusps. Lateral teeth sickle shaped.

REMARKS. — This very spinose species lives in a restricted area, occurring sympatrically with *Leptotrophon spinacutus*, *L. acerapex*, *L. tirardi*, *L. charcoti*, and *Conchatalos vaubani*, all of which have a wider geographic distribution.

ETYMOLOGY. — Named after Bernadette CHARLES (MNHN), for her dedication and patience as copy editor of Mémoires du Muséum national d'Histoire naturelle.

*Leptotrophon caledonicus* sp. nov.

Figs 19-20, 49-50, 97

TYPE MATERIAL. — Holotype and 2 paratypes MNHN.

TYPE LOCALITY. — New Caledonia, SMIB 2, stn DW 23, 22°31' S, 167°37' E, 410-420 m.

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL: stn DW 08, 20°34' S, 166°54' E, 435 m, 2 lv, 2 dd.

MUSORSTOM 4: stn DW 164, 18°33' S, 163°13' E, 255 m, 2 dd.

SMIB 2: stn DW 23, 22°31' S, 167°37' E, 410-420 m, 1 lv (holotype).

CHALCAL 2: stn DW 76, 23°41' S, 167°45' E, 470 m, 1 dd (paratype). — Stn DW 77, 23°38' S, 167°43' E, 435 m, 1 dd (paratype).

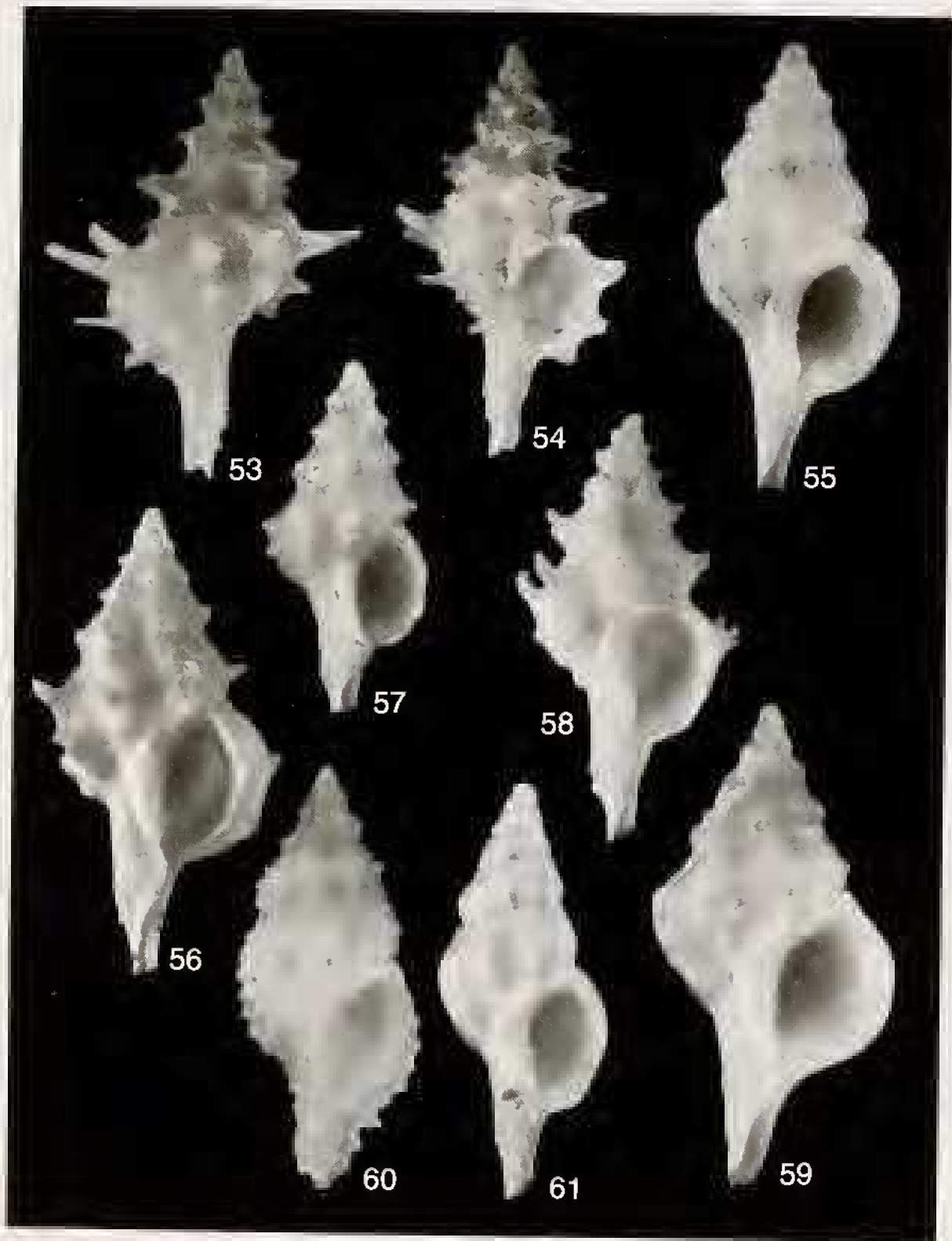
**Loyalty Islands.** BIOGEOCAL: stn DW 291, 20°34' S, 166°54' E, 510-520 m, 1 lv, 7 dd.

MUSORSTOM 6: stn DW 399, 20°42' S, 167°00' E, 282 m, 1 lv, 4 dd. — Stn DC 402, 20°30' S, 166°49' E, 520 m, 1 dd. — Stn DW 410, 20°38' S, 167°07' E, 490 m, 1 lv. — Stn DW 459, 21°01' S, 167°31' E, 425 m, 18 lv & dd.

DISTRIBUTION. — Northern and southern New Caledonia, and Loyalty Islands, 255-520 m. Bathymetrical range for live-taken material 282-520 m.

DESCRIPTION. — *Shell* up to 12.2 mm in length, heavy. Spire high with 1.5 protoconch whorls and up to 5 broadly convex, weakly shouldered teleoconch whorls. *Protoconch* whorls rounded, minutely striate; terminal varix low, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of

spinless or very weakly spinose rounded varices. First to fourth whorls with 8 varices, last whorl with 7 varices. Spiral sculpture of weak, narrow cords: 1 on first and second whorl, 1 or 2 on third whorl, 3 on fourth whorl, including 1 on shoulder, 7 on last whorl, including 2 on shoulder. Aperture



FIGS 53-61. — Genus *Leptotrophon*. — 53-54, *Leptotrophon charcoti* sp. nov. — 53, holotype, 13 mm. — 54, paratype MNHN, BIOCAL: stn DW 51, 12.4 mm. — 55, *L. linevugosus* sp. nov., holotype, 10.9 mm. — 56-59, *L. surprisensis* sp. nov. — 56, holotype, 15 mm. — 57, Atoll de Surprise, LAGON: stn 444, 7.9 mm. — 58, MUSORSTOM 4: stn DW 162, 12 mm. — 59, paratype MNHN, MUSORSTOM 4: stn DW 181, 11 mm. — 60, *L. virginiae* sp. nov., holotype, 8 mm. — 61, *L. marshalli* sp. nov., holotype, 9 mm.

ovate. Columellar lip flaring, smooth or with 2 small denticles abapically, rim partially erect, weakly adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth, with 4 or 5 elongate denticles within, or

smooth. Siphonal canal short, narrow, narrowly open, with 3-5 weak spiral cords. White or pinkish white. Rachidian *radular tooth* with long cusps and denticles. Lateral teeth sickle shaped.

REMARKS. — *Leptotrophon caledonicus* lives sympatrically North of New Caledonia with *L. virginiae* and *L. minispinosus*. It occurs with *L. surprisensis* off the Loyalty Islands.

ETYMOLOGY. — *Caledonicus*: from (New) Caledonia.

*Leptotrophon charcoti* sp. nov.

Figs 24, 52-54, 108-109

TYPE MATERIAL. — Holotype MNHN. Paratypes: 33 MNHN, 2 AMS C301331, 2 NMNZ M262672, 2 NMP L1159/T1194, 2 USNM 860395, 2 RH.

TYPE LOCALITY. — New Caledonia, BIOCAL, stn DW 51, 23°05' S, 167°45' E, 680-700 m.

MATERIAL EXAMINED. — **New Caledonia.** BIOCAL: stn DW 33, 23°10' S, 167°10' E, 675-680 m, 19 lv & dd. — Stn DW 48, 23°00' S, 167°29' E, 775 m, 2 lv & 4 dd. — Stn DW 51, 23°05' S, 167°45' E, 680-700 m, 1 lv (holotype) and 43 lv & dd (paratypes: 33 MNHN, 2 AMS C301331, 2 NMNZ, 2 NMP, 2 USNM, 2 RH). — Stn DW 83, 20°35' S, 166°54' E, 460 m, 1 dd.

MUSORSTOM 4: stn DW 156, 18°54' S, 163°19' E, 525 m, 1 dd. — Stn DW 221, 22°59' S, 167°37' E, 535-560 m, 2 dd.

SMIB 3: stn DW 21, 22°59' S, 167°19' E, 525 m, 3 dd.

**Loyalty Islands.** SMIB 5: stn DW 87, 22°19' S, 168°41' E, 370 m, 1 lv, 1 dd. — Stn DW 91, 22°18' S, 168°41' E, 340 m, 1 lv.

DISTRIBUTION. — Northern, southeastern and southern New Caledonia, and Loyalty Islands, 340-775 m (recorded alive).

DESCRIPTION. — *Shell* up to 13 mm in length at maturity, spinose, lightly built. Spire high with 1.5 protoconch whorls and up to 5 convex, weakly shouldered, spinose teleoconch whorls. *Protoconch* whorls rounded, smooth, weakly elongate; terminal varix low, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of spinose varices. First whorl with 8 varices, second with 8 or 9 varices, third to last whorls with 8 varices. Varices of last whorl with 3 long, open, blunt spines. Shoulder spine longest, abapical spines shortest. Other whorls with rather long shoulder spine. Other axial sculpture

consisting of numerous growth striae. Spiral sculpture consisting of low cords: 2 from first to fourth whorl, 3 on last whorl. No spiral sculpture on shoulder. Aperture ovate. Columellar lip flaring, smooth, rim partially erect, weakly adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth. Siphonal canal long, narrow, straight, narrowly open, smooth. White. Rachidian *radular tooth* with medium sized cusps and denticles, lateral teeth sickle shaped. The illustrated radula (Fig. 24) lacks one of the lateral cusps, and is probably abnormal.

REMARKS. — *Leptotrophon charcoti* has a wide geographical distribution, and is sympatric with *L. spinacutus*, *L. bernadettae*, and *Couchatalos tirardi* off southern New Caledonia.

ETYMOLOGY. — Named after R.V. "Jean-Charcot".

*Leptotrophon surprisensis* sp. nov.

Figs 22, 33, 56-59, 110-111

TYPE MATERIAL. — Holotype MNHN. Paratypes: 33 MNHN, 2 AMS C301332, 2 NMNZ M262673, 2 NMP L1160/T1195, 2 USNM 860396, 3 RH.

TYPE LOCALITY. — New Caledonia, MUSORSTOM 4, stn DW 156, 18°54' S, 163°19' E, 525 m.

MATERIAL EXAMINED. — **Chesterfield Islands.** MUSORSTOM 5: stn 299, 22°48' S, 159°24' E, 360-390 m, 1 lv. — Stn DC 361, 19°53' S, 158°38' E, 400 m, 2 dd.

**New Caledonia.** LAGON: stn 444, 18°15' S, 162°59' E, 300-350 m, 1 lv, 1 dd. — Stn 1152, 18°58' S, 163°24' E, 335 m, 4 dd.

BIOCAL: stn DW 08, 20°34' S, 166°54' E, 435 m, 2 dd. — Stn DW 46, 22°53' S, 167°17' E, 570-610 m, 4 dd.

MUSORSTOM 4: stn DW 156, 18°54' S, 163°19' E, 525 m, 1 lv (holotype), 2 dd (paratypes). — Stn DW 162, 18°35' S, 163°10' E, 525 m, 2 lv, 2 dd. — Stn DW 181, 18°57' S, 163°22' E, 350 m, 8 lv, 8 dd (paratypes: 12 MNHN, 2 AMS, 2 NMNZ). — Stn DW 184, 19°04' S, 163°27' E, 260 m, 12 lv & dd (paratypes: 8 MNHN, 2 NMP, 2 USNM). — Stn DW 197, 18°51' S, 163°21' E, 550 m, 14 lv & dd (paratypes: 11 MNHN, 3 RH).

DISTRIBUTION. — Chesterfield Reefs, northern and southern New Caledonia, and Loyalty Islands, 260-610 m. Bathymetrical range for live-taken material 260-550 m.

DESCRIPTION. — *Shell* up to 15 mm in length at maturity. Spire high, with 1.5 protoconch whorls and up to 5 broad, shouldered, teleoconch whorls. *Protoconch* whorls smooth, glossy; terminal varix delicate. *Teleoconch* suture weakly appressed. Axial sculpture consisting of strong, rounded varices. First whorl with 8 varices, second to fourth whorls with 7 varices, last whorl with 6 varices bearing 2 short, acute, open spines, occasionally very weak. Shoulder spine longest. Other whorls with one more or less sharp shoulder spine. Other axial sculpture consisting of numerous growth

striae. Spiral sculpture consisting of low, broad cords: 1 on first to fourth whorl, last whorl with 2 cords. No spiral sculpture on shoulder. Aperture ovate. Columellar lip flaring, smooth, adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth, occasionally with 2 or 3 abapical elongate nodes within. Siphonal canal medium sized, narrow, straight, narrowly open, smooth. Translucent white or light brown with small orange blotches on the varices. Rachidian *radular tooth* with medium sized cusps and denticles, lateral teeth sickle shaped.

REMARKS. — *Leptotrophon surprisensis* is one of the largest, most common and variable *Leptotrophon* species from the New Caledonian area. It is sympatric in the North with *L. lineorugosus*, *L. marshalli*, and *L. protocarinatus*, in the South with *L. caroae*, and in the Loyalty Islands with *L. caledonicus*.

ETYMOLOGY. — From Surprise Atoll, one of the localities.

*Leptotrophon virginiae* sp. nov.

Figs 60, 112

TYPE MATERIAL. — Holotype lv and 2 paratypes dd MNHN.

TYPE LOCALITY. — New Caledonia, MUSORSTOM 4, stn DW 164, 18°33' S, 163°13' E, 255 m.

MATERIAL EXAMINED. — Only known from the type material.

DISTRIBUTION. — Only known from the type locality, northern New Caledonia. Recorded alive in 255 m.

DESCRIPTION. — *Shell* up to 8.2 mm, weakly spinose, lightly built. Spire high with 1.5 protoconch whorls and up to 4.5 elongate, weakly convex whorls. *Protoconch* whorls smooth, weakly subcarinate, with a single spiral keel; terminal varix low, delicate. *Teleoconch* suture weakly impressed. Axial sculpture consisting of weakly spinose, low varices. First whorl with 9 varices, second with 6 or 7 varices, third and fourth whorls with 6 varices. Last whorl with 6 or 7 very

short, approximately equal-sized, open spinelets. Other axial sculpture of numerous axial growth striae. Spiral sculpture consisting of equal-sized, somewhat squamous cords: 2 on first whorl, 2 or 3 on second whorl of which 1 on shoulder, 4 on third whorl, of which 2 on shoulder, 8 or 9 on last whorl, of which 2 on shoulder. Aperture ovate. Columellar lip flaring, smooth, rim partially erect, adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect.



smooth. Siphonal canal short, narrow, narrowly open, with 2 spiral cords. Translucent white; one juvenile (paratype) with dark brown blotches at base of siphonal canal. *Radula* unknown.

REMARKS. — *Leptotrophon virginiae* is sympatric with *L. caledonicus* and *L. minispinosus*.

ETYMOLOGY. — Named after Virginie HEROS (MNIN), who sorted much of the material here studied.

*Leptotrophon marshalli* sp. nov.

Figs 61, 113-114

TYPE MATERIAL. — Holotype and 2 paratypes MNHN.

TYPE LOCALITY. — New Caledonia, MUSORSTOM 4, stn DW 196, 18°55' S, 163°24' E, 450 m.

MATERIAL EXAMINED. — New Caledonia. MUSORSTOM 4: stn DW 162, 18°35' S, 163°10' E, 525 m, 1 dd (paratype). — Stn DW 196, 18°55' S, 163°24' E, 450 m, 2 lv (holotype and paratype).

DISTRIBUTION. — Only known from the type locality, northern New Caledonia, in 450-525 m; recorded alive in 450 m.

DESCRIPTION. — *Shell* up to 9 mm in length at maturity, elongate, lightly built. Spire high with 1.5 protoconch whorls and up to 5 elongate, weakly shouldered teleoconch whorls. *Protoconch* whorls rounded, smooth, glossy; terminal varix low, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of spineless, rounded varice. First whorl with 8 or 9 varices, second with 7 or 8 varices, third with 7 varices, fourth with 7 or 8 varices, last whorl with 6 varices. Other

axial sculpture of numerous growth striae. Spiral sculpture consisting of numerous microscopic threads over whole shell. Aperture ovate. Columellar lip flaring, smooth, rim partially erect, adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth, with small node within abapically. Siphonal canal medium sized, narrow, straight, narrowly open, with microscopic spiral striae. White. *Radula* unknown.

REMARKS. — *Leptotrophon marshalli* occurs in a restricted geographical area to the north of New Caledonia where it is sympatric with *L. surprisensis*.

ETYMOLOGY. — Named after Bruce MARSHALL (NMNZ), who as visiting curator to MNHN in 1989, sorted much of the present material.

*Leptotrophon protocarinatus* sp. nov.

Figs 21, 34, 62, 106-107

TYPE MATERIAL. — Holotype MNHN. Paratypes: 5 MNHN, 1 NMNZ M262674, 1 RH.

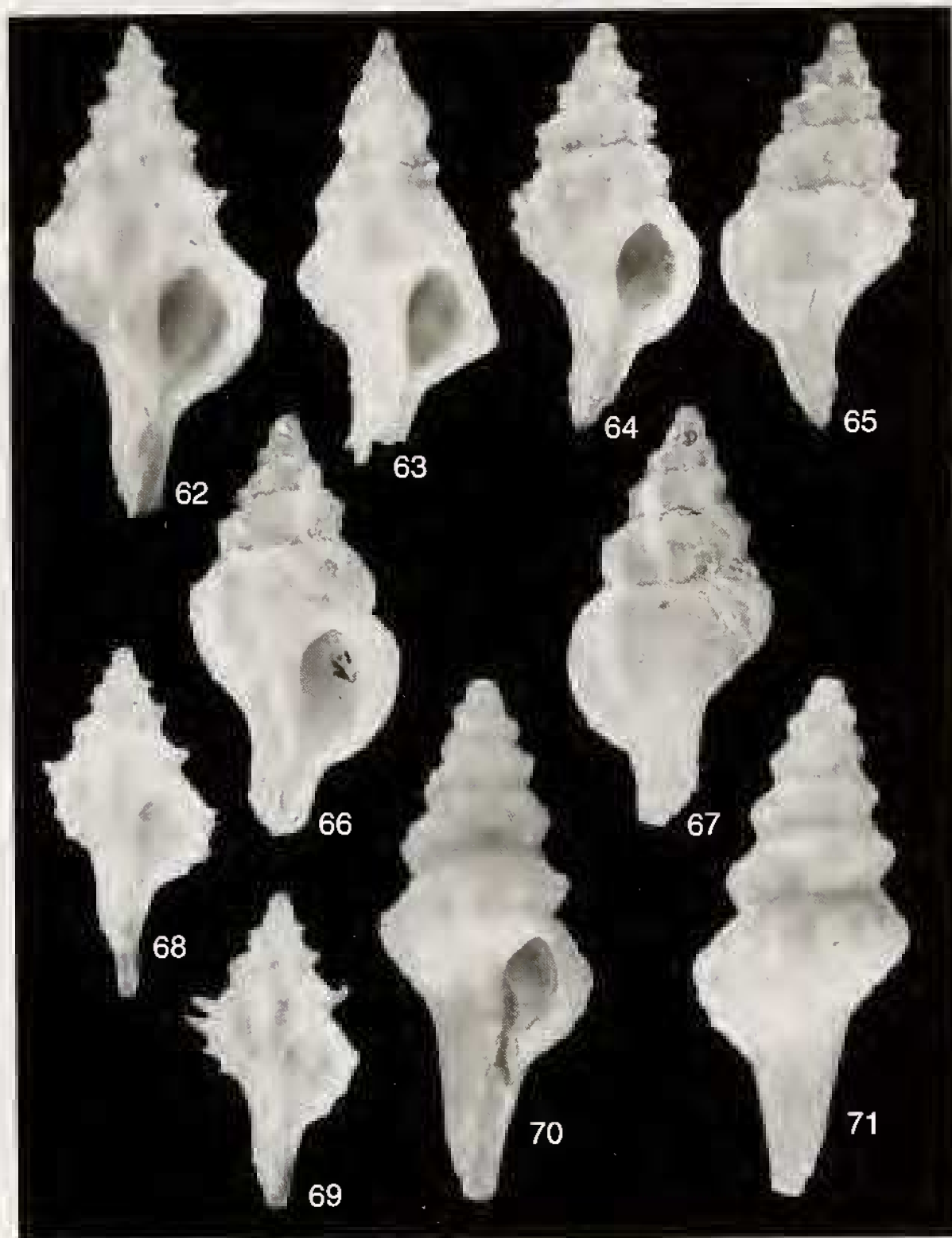
TYPE LOCALITY. — New Caledonia, LAGON, stn 444, 18°15' S, 162°59' E, 300-350 m.

MATERIAL EXAMINED. — Only known from the type material.

DISTRIBUTION. — Only known from the type locality, northern New Caledonia, in 300-350 m, recorded alive.

DESCRIPTION. — *Shell* up to 11 mm in length at maturity, spinose, delicate. Spire high with 1.5 protoconch whorls and up to 5 broad, weakly shouldered teleoconch whorls. *Protoconch* whorls strongly subcarinate with a single spiral keel,

otherwise smooth; terminal varix low, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of weakly spinose varices. First whorl with 9 varices, second with 7 or 8 varices, third and fourth with 7 varices, last whorl with 6



FIGS 62-71. — Genus *Leptotrophon*. — 62. *Leptotrophon protocarinatus* sp. nov., holotype, 10.8 mm. — 63. *L. inaequalis* sp. nov., holotype, 12.9 mm. — 64-65. *L. musorstomae* sp. nov., holotype, 9.9 mm. — 66-67. *L. richeri* sp. nov., holotype, 10 mm. — 68-69. *L. coriolis* sp. nov. — 68. holotype, 8.2 mm. — 69. paratype MNHN, MUSORSTOM 5: stn 362, 7.5 mm. — 70-71. *L. coralensis* sp. nov., holotype, 9.5 mm.

varices bearing 4, or occasionally 5 small, short spines. Shoulder spine longest. Other whorls with 1 or 2 small spines. Spiral sculpture consisting of primary, weak cords; 2 from first to fourth whorl, 4 or rarely 5 on last whorl. Occasionally with weak, secondary cords on last whorl. No spiral sculpture on shoulder. Aperture ovate. Columellar lip flaring, smooth, rim partially erect, adherent at adapical extremity. Anal

notch shallow, broad. Outer lip erect, smooth. Siphonal canal medium sized, narrow, straight, narrowly open, smooth. Translucent white, rarely with very pale brown blotch between axial varices, on shoulder of teleoconch whorl. Rachidian *radular tooth* with medium sized cusps and denticles, lateral teeth sickle shaped.

REMARKS. — *Leptotrophon protocarinatus* is remarkable for its keeled protoconch. It lives in a very restricted geographical area, sympatrically with *L. surprisensis*.

ETYMOLOGY. — Named for the keeled protoconch.

*Leptotrophon inaequalis* sp. nov.

Figs 63, 115

TYPE MATERIAL. — Holotype and paratype MNHN.

TYPE LOCALITY. — New Caledonia, BIOCAL, stn DW 38, 23°00' S, 167°15' E, 360 m.

MATERIAL EXAMINED. — **New Caledonia**, BIOCAL: stn DW 38, 23°00' S, 167°15' E, 360 m, 1 dd (holotype).

SMIB 2: stn DW 03, 22°56' S, 167°15' E, 412-428 m, 1 dd (paratype).

DISTRIBUTION. — Southern New Caledonia, in 360-428 m; not recorded alive.

DESCRIPTION. — *Shell* up to 12.9 mm in length at maturity, heavy. Spire high with 1.5 protoconch whorls and up to 5 strongly shouldered teleoconch whorls. *Protoconch* whorls strongly subcarinate with a single spiral keel, otherwise smooth; terminal varix unknown (eroded). *Teleoconch* suture impressed. Axial sculpture consisting of strongly shouldered, almost spineless varices. First and second whorls with 7 varices, third and fourth with 6 or 7 varices, last whorl with 5 varices. Shoulder spine short, broad, heavy. Other axial

sculpture of numerous growth striae. Spiral sculpture consisting of a shallow, broad cord that interconnect the shoulder spines. Other spiral sculpture of numerous, fine striae. Aperture ovate. Columellar lip flaring, smooth, rim partially erect, adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth, with small abapical node within. Siphonal canal short, narrow, straight, narrowly open, smooth. White. *Radula* unknown.

REMARKS. — *Leptotrophon inaequalis* is a very strange form with strongly shouldered teleoconch whorls. It lives with *L. acerapex*.

ETYMOLOGY. — *Inaequalis* (Latin) = unequal.

*Leptotrophon coriolis* sp. nov.

Figs 17-18, 68-69, 116-117

TYPE MATERIAL. — Holotype MNHN. Paratypes: 3 MNHN, 1 NMNZ M262675, 1 NMP L1161/T1196, 1 RH.

TYPE LOCALITY. — Coral Sea, MUSORSTOM 5, stn DC 362, 19°53' S, 158°40' E, 410 m.

MATERIAL EXAMINED. — **Chesterfield Islands**, MUSORSTOM 5: stn DC 345, 19°40' S, 158°32' E, 305-310 m, 1 lv. — Stn DC 361, 19°53' S, 158°38' E, 400 m, 1 dd. — Stn DC 362, 19°53' S, 158°40' E, 410 m, 1 lv (holotype), 6 lv & dd (paratypes: 3 MNHN, 1 NMNZ, 1 NMP, 1 RH. — Stn DC 372, 19°53' S, 158°39' E, 400 m, 1 dd. — Stn DC 379, 19°53' S, 158°40' E, 370-400 m, 1 lv.

DISTRIBUTION. — Chesterfield Reefs, 305-410 m; recorded alive.

DESCRIPTION. — *Shell* up to 8.2 mm in length, spinose, lightly built. Spire high with 1.5 protoconch whorls and up to 4 convex, weakly shouldered teleoconch whorls. *Protoconch* whorls rounded, smooth, glossy. Terminal varix low, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of spinose varices. First and second whorls with 8 varices, third with 7 or 8 varices, last whorl with 6 varices bearing 3 short, sharp spines. Shoulder spine longest. Other whorls with a single shoulder spine. Other axial sculpture of numerous growth striae. Spiral sculpture consisting of weak cords, almost obsolete between varices: 1 or 2 on first whorl, 2 on

second and third whorl, 3 on last whorl. Aperture ovate. Columellar lip flaring, usually with 1 or 2 denticles abapically, rim partially erect, adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth, with one small knob abapically and 3 or 4 lirae within. Siphonal canal medium sized, narrow, straight, narrowly open, smooth. Teleoconch translucent white with tip of shoulder spines of last teleoconch whorl occasionally orange coloured. Protoconch very pale brown. Rachidian *radular tooth* with medium sized cusps and denticles, lateral teeth sickle shaped.

REMARKS. — No other species of *Leptotrophon* or *Conchatalos* have been found to be sympatric with *L. coriolis*.

ETYMOLOGY. — Named after R.V. "Coriolis".

*Leptotrophon musorstomae* sp. nov.

Figs 64-65, 119

TYPE MATERIAL. — Holotype MNHN.

TYPE LOCALITY. — New Caledonia, MUSORSTOM 4, stn DC 168, 18°48' S, 163°11' E, 720 m.

MATERIAL EXAMINED. — Only known from the type material.

DISTRIBUTION. — Only known from the type locality, northern New Caledonia, in 720 m; not recorded alive.

DESCRIPTION. — *Shell* up to 9.9 mm in length, stout. Spire high with 1.75 protoconch whorls and up to 4 convex, weakly shouldered teleoconch whorls. *Protoconch* bulbous, smooth; terminal varix unknown (eroded). *Teleoconch* suture impressed. Axial sculpture consisting of 9 rounded varices from first to last whorls. Spiral sculpture consisting of weak, rounded cords: 2 on first and second whorls, 3 on third whorl, 5 on

last whorl. Spiral cords ending as rounded knobs on the varices imparting a tuberculate appearance on the shell. Shoulder with 1 or 2 weak secondary cords. Aperture ovate. Inner and outer lip slightly broken. Outer lip with 2 abapical elongate knobs within. Anal notch shallow, broad. Siphonal canal medium sized, straight, open, smooth. White. *Radula* unknown.

REMARKS. — No other similar species have been found to be sympatric with *L. musorstomae*.

ETYMOLOGY. — Named after the cruise name MUSORSTOM.

*Leptotrophon richeri* sp. nov.

Figs 66-67, 118

TYPE MATERIAL. — Holotype and 2 paratypes MNHN.

TYPE LOCALITY. — New Caledonia, MUSORSTOM 4, stn DW 160, 18°42' S, 163°13' E, 668 m.

MATERIAL EXAMINED. — New Caledonia, MUSORSTOM 4: stn DW 160, 18°42' S, 163°13' E, 668 m, 1 dd (holotype). — Stn DW 161, 18°39' S, 163°11' E, 550 m, 2 dd (paratypes).

DISTRIBUTION. — Northern New Caledonia, in 550-668 m: not recorded alive.

DESCRIPTION. — *Shell* up to 10 mm in length at maturity, stout. Spire high with 1.5 protoconch whorls and up to 5 broad, weakly shouldered whorls. *Protoconch* whorls rounded, smooth; terminal varix unknown (eroded). *Teleoconch* suture impressed. Axial sculpture consisting of low, rounded varices. First and second whorls with 8 varices, third with 8 or 9 varices, fourth with 8 varices, last whorl with 6 or 7 varices. Other axial sculpture of numerous growth striae.

Spiral sculpture consisting of rounded, weak cords: 2 from first to third whorls, 6 on fourth whorl, including 2 on shoulder, 10 or 11, including 2 on shoulder on last whorl. Aperture ovate. Columellar lip smooth. Inner and outer lip of specimens partially broken. Anal notch shallow, broad. Outer lip erect, smooth. Siphonal canal short, narrow, straight, open, smooth. Whitish. *Radula* unknown.

REMARKS. — *Leptotrophon richeri* is sympatric with *L. lineorugosus*.

ETYMOLOGY. — Named after Bertrand RICHER DE FORGES, senior scientist during the MUSORSTOM 4 cruise.

*Leptotrophon coralensis* sp. nov.

Figs 70-71, 120-121

TYPE MATERIAL. — Holotype dd MNHN.

TYPE LOCALITY. — Lansdowne-Fairway Ridge, CORAIL 2, stn DE 14, 21°01' S, 160°57' E, 650-660 m.

MATERIAL EXAMINED. — Only known from the type material.

DISTRIBUTION. — Only known from the type locality, not recorded alive.

DESCRIPTION. — *Shell* up to 9.5 mm in length at maturity, narrow, stout. Spire high with 1.5 protoconch whorls and up to 5 strongly shouldered teleoconch whorls. *Protoconch* smooth, whorls rounded, glossy; terminal varix low, delicate. *Teleoconch* suture weakly appressed. Axial sculpture consisting of low, rounded varices. First whorl with 9 varices, second with 8 varices, third and fourth with 9 varices, last whorl with 7 varices. Varices bearing a short, open, shoulder

spine. Spiral sculpture consisting of one low, carinal cord, almost obsolete between varices. Last whorl with 3 or 4 very weak, secondary cords abapically. Aperture ovate, small. Columellar lip partially broken, with one small denticle abapically. Anal notch shallow, broad. Outer lip erect, smooth, abapically with 3 small elongate nodes within. Siphonal canal medium sized, narrow, straight, open, smooth. Translucent white. *Radula* unknown.

REMARKS. — Known only from one specimen, this species differs from other known *Leptotrophon* species (Table 2). It is not sympatric with any other similar species.

ETYMOLOGY. — Named after the Coral Sea.

*Leptotrophon metivieri* sp. nov.

Figs 72-73, 122

TYPE MATERIAL. — Holotype dd MNHN. Paratypes dd: 4 MNHN, 1 NMP L1162/T1197, 1 NMNZ M262676, 1 RH.

TYPE LOCALITY. — New Caledonia. CHALCAL 2, stn DW 76, 23°41' S, 167°45' E, 470 m.

MATERIAL EXAMINED. — Only known from the type material.

DISTRIBUTION. — Only known from the type locality, not recorded alive.

DESCRIPTION. — *Shell* up to 7.8 mm in length, spinose, lightly built. Spire high, acute with 1.75 protoconch whorls

and up to 4 broad, weakly spinose teleoconch whorls. *Protoconch* elongate, acute, whorls smooth, glossy; terminal



TABLE 2. — Characters of *Leptotrophon* described in this paper.

Species	Character/character state										
	1	2	3	4	5	6	7	8	9	10	11
<i>Leptotrophon acerapex</i>	acuminate		spinose	long	straight	strong	1	0	3	no	12.5
<i>L. bernadettae</i>	acuminate		spinose	long	bent	strong	2	2-3	5	no	12
<i>L. biocalae</i>	carinate		spinose	long	straight	weak	1	0-1	3	yes	8
<i>L. caledonicus</i>	rounded			short	straight	weak	1	2	5	yes	12.2
<i>L. caroae</i>	rounded	narrow	spinose	long	straight	weak	1	1	5	no	9.3
<i>L. charcoti</i>	rounded		spinose	long	straight	weak	2	0	3	no	13
<i>L. coralensis</i>	rounded	narrow	spinose	long	straight	strong	1	0	4-5	no	9.5
<i>L. coriolis</i>	rounded		spinose	long	straight	weak	1-2	0	3	no	8.2
<i>L. inaequalis</i>	carinate	narrow	spinose	short	straight	strong	1	0	1	no	12.9
<i>L. levii</i>	rounded	narrow	spinose	long	bent	weak	2	1	4-5	no	7.9
<i>L. lineorugosus</i>	rounded			long	straight	weak	3	2-4	17-19	yes	10.9
<i>L. marshalli</i>	rounded	narrow		long	straight	weak	1	0	0	yes	9
<i>L. metivieri</i>	acuminate		spinose	short	straight	weak	2	1	6-7	yes	7.8
<i>L. minispinosus</i>	rounded	narrow	spinose	long	straight	weak	1	1-3	2-4	no	11.2
<i>L. musorstomae</i>	rounded		spinose	long	straight	weak	1-2	1-2	5	no	9.9
<i>L. protocarinatus</i>	carinate		spinose	long	straight	weak	2	0	4-5	no	11
<i>L. richeri</i>	rounded			short	straight	weak	2	2	10-11	no	10
<i>L. rigidus</i>	rounded		spinose	long	straight	strong	2	2-3	5-6	no	13.5
<i>L. spinacutus</i>	rounded		spinose	long	straight	weak	1	1	5-6	yes	12
<i>L. surprisensis</i>	rounded		spinose	long	straight	weak	1	0	2	no	15
<i>L. turritellatus</i>	carinate	narrow	spinose	long	straight	strong	1	0	2	yes	11.2
<i>L. virginiae</i>	carinate	narrow	spinose	short	straight	weak	2	2	6	yes	8.2

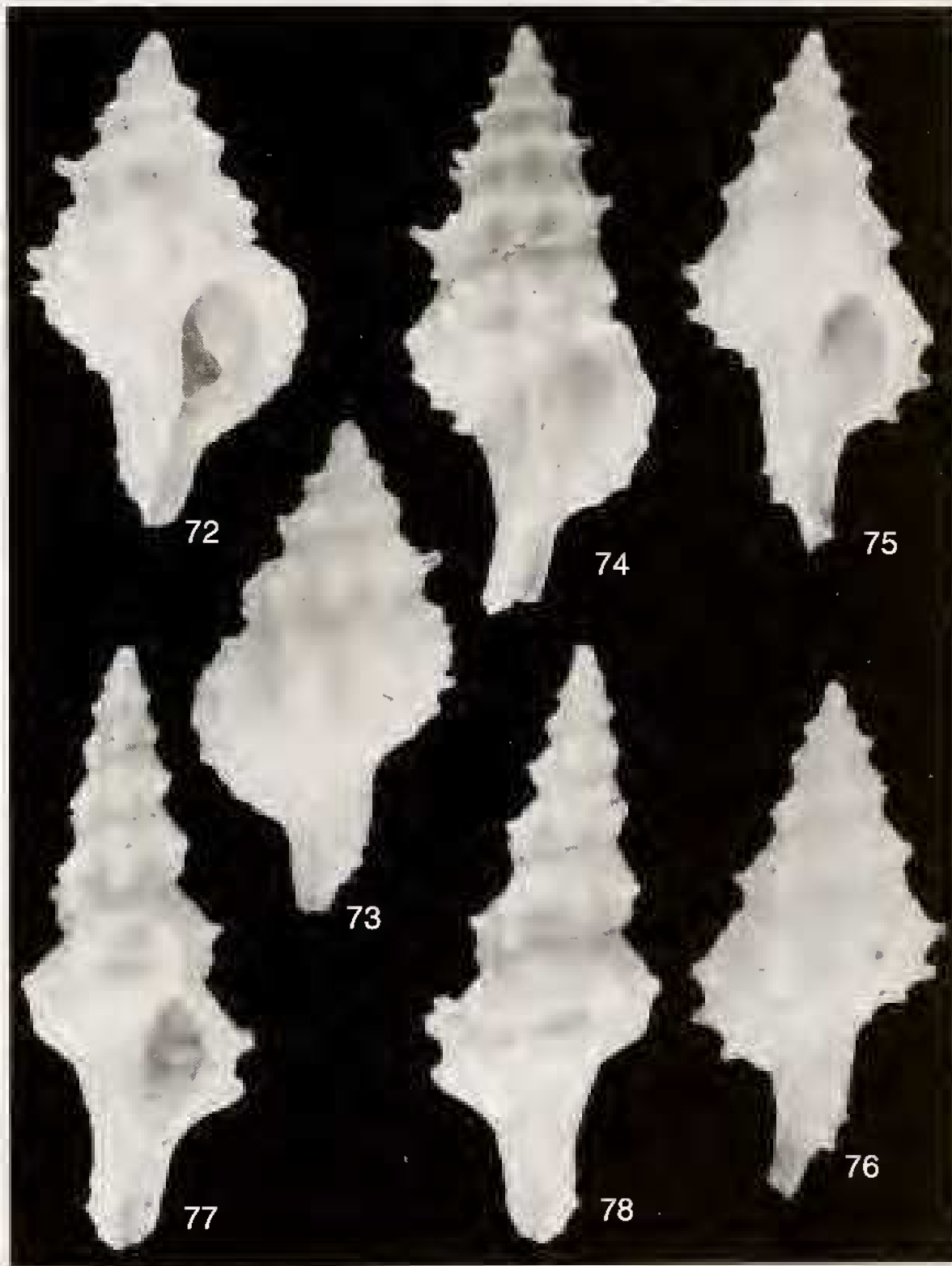
(1) Form of protoconch; (2) Form of shell; (3) Sculpture; (4) Length of siphonal canal; (5) Form of siphonal canal; (6) Shell shoulder; (7) Number of spiral cords on first teleoconch whorl; (8) Number of spiral cords on shoulder of last teleoconch whorl; (9) Number of cords (not lirae) on last teleoconch whorl; (10) Spiral sculpture on siphonal canal (present/absent); (11) Maximum shell length (mm).

varix obsolete. *Teleoconch* suture impressed. Axial sculpture consisting of rounded, somewhat spinose varices. First whorls with 9 varices, second and third with 8 varices, last whorl with 7 varices bearing 6 very short, acute spines, occasionally reduced to small knobs. Spiral sculpture consisting of low, rounded cords; 2 on first and second whorls, 3 or 4 on third and 6, or occasionally 7 on last whorl. Third and

last whorls with one cord on shoulder. Aperture ovate. Columellar lip flaring, smooth, rim partially erect, adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth, with narrow, weak lirae within, and one small node abapically. Siphonal canal short, narrow, straight, open, with shallow spiral cords. Translucent white. *Radula* unknown.

REMARKS. — All known specimens have only 4 teleoconch whorls and are probably immature. It is sympatric with *Conchatalos canalibrevis*.

ETYMOLOGY. — Named after Bernard MÉTIVIER (MNHN), scientist on board of the R.V. "Coriolis" during the CHALCAL 2 cruise.



FIGS 72-78. — Genus *Leptotrophon*.—72-73, *Leptotrophon metivieri* sp. nov., holotype, 7.8 mm. — 74, *L. minispinosus* sp. nov., holotype, 11.1 mm. — 75-76, *L. biocalae* sp. nov., holotype, 8 mm. — 77-78, *L. turrillatus* sp. nov., holotype, 11.5 mm.

*Leptotrophon biocalae* sp. nov.

Figs 75-76, 124

TYPE MATERIAL. — Holotype and 3 paratypes dd MNHN.

TYPE LOCALITY. — New Caledonia, BIOCAL, stn DW 64, 24°48' S, 168°09' E, 250 m.

MATERIAL EXAMINED. — Only known from the type material.

DISTRIBUTION. — Only known from the type locality, not recorded alive.

DESCRIPTION. — *Shell* up to 8 mm in length at maturity, spinose, lightly built. Spire high with 1.5 protoconch whorls and up to 5 convex, weakly shouldered teleoconch whorls. *Protoconch* small, weakly carinate with a single spiral keel, otherwise smooth; terminal varix low, delicate. *Teleoconch* suture weakly impressed. Axial sculpture consisting of low spinose varices. First and second whorls with 7 varices, third and fourth whorls with 6 varices, last whorl with 5 varices bearing 3 short, narrow, open spines. Other whorls with a short, open shoulder spine. Other axial sculpture consisting

of numerous, fine growth striae. Spiral sculpture consisting of weak cords: 1 on first whorl, 2 on second to fourth whorls, last whorl with 3 or 4 cords. Occasionally one low, weak spiral cord on shoulder of last whorl. Aperture ovate. Columellar lip flaring, smooth, rim partially erect, adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth. Siphonal canal medium sized, narrow, weakly abaperturally bent, narrowly open, with 2 or 3 shallow, low spiral cords. White. *Radula* unknown.

REMARKS. — *Leptotrophon levii* was dredged in the vicinity, though at greater depth (505-515 m). No other species of *Leptotrophon* or *Conchatalos* is known to be sympatric.

ETYMOLOGY. — Named after the cruise name BIOCAL.

*Leptotrophon turritellatus* sp. nov.

Figs 77-78, 125

TYPE MATERIAL. — Holotype dd MNHN.

TYPE LOCALITY. — New Caledonia, SMIB 5, stn DW 102, 23°20' S, 168°05' E, 305 m.

MATERIAL EXAMINED. — Only known from the type material.

DISTRIBUTION. — Only known from the type locality, not recorded alive.

DESCRIPTION. — *Shell* 11.2 mm in length. Spinose, narrow, lightly built. Spire high, acute, consisting of 1.5 protoconch whorls and 6 narrow, shouldered teleoconch whorls. *Protoconch* carinate with a single spiral keel, otherwise smooth; terminal varix low, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of low varices. First and second whorls with 7 varices, third to fifth whorls with 6 varices, last whorl with 5 varices with 2 small, open spines. Other axial sculpture of numerous growth striae. Spiral sculpture consist-

ing of low, rounded cords: 1 on first and second whorls, 2 from second to last whorl. Other spiral sculpture of numerous, fine striae. No spiral sculpture on shoulder except fine striae. Aperture ovate. Columellar lip flaring (rim somewhat broken), smooth, rim partially erect, adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth. Siphonal canal medium-sized, broad, straight, narrowly open, with 4 weak, low spiral cords. Glossy white. *Radula* unknown.

REMARKS. — *Leptotrophon turritellatus* is a strange form, narrow with a comparatively broad siphonal canal. Although known by only a single specimen, *L. turritellatus* is distinct from the other species of *Leptotrophon*.

ETYMOLOGY. — Named for its elongate form, as in the gastropod genus *Turritella*.

*Leptotrophon minispinosus* sp. nov.

Figs 74, 123

TYPE MATERIAL. — Holotype MNHN. Paratypes: 4 MNHN, 1 NMNZ M262677, 1 RIL.

TYPE LOCALITY. — New Caledonia, MUSORSTOM 4, stn DW 184, 19°04' S, 163°27' E, 260 m.

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 4: stn DW 164, 18°33' S, 163°13' E, 255 m, 1 lv (paratype NMNZ). — Stn DW 184, 19°04' S, 163°27' E, 260 m, 1 lv (holotype), 5 lv & dd (paratypes: 4 MNHN, 1 RH).

DISTRIBUTION. — Northern New Caledonia, in 255-260 m; recorded alive.

DESCRIPTION. — *Shell* up to 11.2 mm in length at maturity, weakly spinose. Spire high with 1.5 protoconch whorls and up to 6 narrow, weakly shouldered, spinose teleoconch whorls. *Protoconch* whorls rounded, smooth; terminal varix low, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of low varices. First whorl with 9 varices, second with 7 or 8 varices, third to fifth whorls with 7 varices, last whorl with 6 varices bearing 1-3 short, acute, open spines. Spiral sculpture consisting of weak cords: 1 from first to third whorls, 1 or 2 on fourth whorl, 2 on fifth whorl, 3 or 4 on last

whorl. Penultimate whorl with 1 cord on shoulder, last teleoconch whorl with 1 or 2 primary cords and 1 weak, secondary cord on shoulder. Aperture ovate. Columellar lip flaring, smooth, rim partially erect, adherent at adapical extremity. Anal notch smooth, broad. Outer lip erect, smooth, with 2 or 3 weak denticles inside adapically. Siphonal canal medium sized, narrow, straight, narrowly open, smooth. White or beige, with some irregularly placed light brown coloured blotches. *Radula* unknown.

REMARKS. — *Leptotrophon minispinosus* lives sympatrically with *L. caledonicus*, and *L. virginiae*.

ETYMOLOGY. — From *minimus* (Latin) = very small, and *spinosus* (Latin) = spinose.

Genus *CONCHATALOS* gen. nov.

Type species: *Trophon lacrima* Houart, 1991: Recent, Southern New Caledonia.

DIAGNOSIS. — *Shell* up to 13 mm in length, last teleoconch whorl globose, with 5-9 axial ribs. Aperture large, roundly-ovate, with flaring columellar lip. Siphonal canal short, straight or occasionally weakly bent, spineless, open. Rachidian *radular tooth* with medium-sized to long, triangular central cusp; lateral denticles and marginal cusps small or reduced to folds, lateral cusps small and broadly triangular. Lateral teeth sickle-shaped.

REMARKS. — The species of *Conchatalos* are different from these of *Leptotrophon* in being spineless with a more globose last teleoconch whorl, a broader aperture and a shorter siphonal canal. The morphology of the radula is also distinctive (Figs 25-27). Specific characters are compared in Table 3.

ETYMOLOGY. — From *Conchè* (Greek): shell and *atalos* (Greek): delicate.

TABLE 3. — Characters of species of *Conchatalos* described in this paper.

Species	Character/character state								
	1	2	3	4	5	6	7	8	9
<i>Conchatalos canalibrevis</i>	rounded	short	bent	weak	2	1	4-6	no	5.9
<i>C. lacrima</i>	conical	short	bent	weak	1	0	0	no	12
<i>C. tirardi</i>	rounded	short	bent	weak	1	2-3	10-14	yes	13
<i>C. vaubani</i>	rounded	short	straight	weak	2	2	8-9	yes	11.9

(1) Form of protoconch; (2) Length of siphonal canal; (3) Form of siphonal canal; (4) Shell shoulder; (5) Number of spiral cords on first teleoconch whorl; (6) Number of spiral cords on shoulder of last teleoconch whorl; (7) Number of cords (not lirae) on last teleoconch whorl; (8) Spiral sculpture on the siphonal canal (present/absent); (9) Maximum shell length (mm).

*Conchatalos lacrima* (Houart, 1991)

Figs 25, 35, 80, 128-129

*Trophon lacrima* Houart, 1991: 52, figs 31-32, 40, 55-56.

TYPE MATERIAL. — Holotype MNHN. Paratypes: 38 MNHN, 2 AMS C164823, 2 RH, 2 NMP T280/K7294, 2 NMNZ MF57498, 1 NSMT Mo-69563, 2 USNM 859447.

TYPE LOCALITY. — New Caledonia, BIOCAL, stn DW 44, 22°47' S, 167°14' E, 440-450 m.

MATERIAL EXAMINED. — New Caledonia, BIOCAL: stn DW 44, 22°47' S, 167°14' E, 440-450 m, 50 dd & lv (holotype and paratypes). SMIB 2: stn DW 02, 22°52' S, 167°13' E, 415 m, 1 lv (paratype).

DISTRIBUTION. — Southern New Caledonia, 415-450 m: recorded alive.

DESCRIPTION. — *Shell* up to 12 mm in length at maturity. Spire high and acute, with 1.5 protoconch whorls and up to 5 weakly shouldered teleoconch whorls. *Protoconch* conical, whorls smooth, ending with a very weakly erect terminal varix. *Teleoconch* suture lightly appressed. First and second whorls with 9 or 10 low axial ridges, third and fourth with 8 or 9 ridges, last whorl with 5-7 axial ridges. From fourth whorl ridges becoming irregularly spaced, generally leaving a broad gap between penultimate and last varix, some varices forming a sharp, arched lamella on last whorl. Other axial

sculpture consisting of growth striae. Numerous fine spiral lirae covering whole surface of shell. Aperture broad, large. Columellar lip flaring, smooth, rim partially erect, adherent adapically on a small portion. Anal notch shallow. Outer lip thin and smooth. Siphonal canal short, narrowly open, smooth, bent adaperturally. Whitish with very light brownish blotches. Rachidian *radular tooth* with long central cusp, 2 smaller lateral cusps and 1 or 2 marginal folds. Lateral teeth sickle shaped.

REMARKS. — As already stated (HOUART, 1991: 53), *Conchatalos tirardi* is related to *C. lacrima* but differs in having a larger shell with more rounded protoconch, fewer, more strongly developed spiral cords, and more numerous axial ribs on the last teleoconch whorl. It is sympatric with *Leptotrophon acerapex* and *L. carcae*.

*Conchatalos tirardi* (Houart, 1991)

Figs 26, 81-82, 126-127

*Trophon tirardi* Houart, 1991: 53, figs 33-34, 41-42, 57-58.

TYPE MATERIAL. — Holotype MNHN. Paratypes: 61 MNHN, 2 AMS C164824, 2 RH, 2 NMP T363/K7295, 2 NMNZ MF57499, 1 NSMT Mo-69564, 2 USNM 859448.



TYPE LOCALITY. — New Caledonia, BIOCAL, stn DW 51, 23°05' S, 167°45' E, 680-700 m.

MATERIAL EXAMINED. — **New Caledonia**, BIOCAL: stn DW 33, 23°10' S, 167°10' E, 675-680 m, 11 lv (paratypes). — Stn DW 36, 23°09' S, 167°11' E, 650-680 m, 1 lv (paratype). — Stn DW 51, 23°05' S, 167°45' E, 680-700 m, 54 lv & dd (holotype and paratypes: 42 MNHN, 2 AMS, 2 RH, 2 NMP, 2 NMNZ, 1 NSMT, 2 USNM).

MUSORSTOM 4: stn DW 220, 22°58' S, 167°38' E, 505-550 m, 3 lv (paratypes). — Stn DW 221, 22°59' S, 167°37' E, 535-560 m, 2 lv (paratypes). — Stn DW 222, 22°58' S, 167°33' E, 410-440 m, 2 lv (paratypes).

DISTRIBUTION. — Southern New Caledonia, 410-700 m; recorded alive.

DESCRIPTION. *Shell* up to 13 mm in length at maturity. Spire high, with 1.5 protoconch whorls and up to 5 broadly convex, weakly shouldered teleoconch whorls. *Protoconch* whorls rounded, smooth, ending with a shallow terminal varix. *Teleoconch* suture impressed. Axial sculpture of first 10 third whorls of 8-10 low, sharp ribs, fourth whorl with 9 or 10 ribs and last whorl with 8 or 9 ribs. Some ribs produce erect, irregularly placed, arched lamellae. Other axial sculpture consisting of numerous, frilled, lirac. Spiral sculpture of 10-14 nodulose, shallow or strongly developed cords on last

whorl. Carinal cord sometimes stronger, with an occasional small knob or spine where it cross axial ribs. Aperture large and broad. Columellar lip flaring, rim erect. Anal notch shallow, broad. Outer lip thin, smooth, occasionally with small abapical denticle within. Siphonal canal short, narrowly open with 5 or 6 spiral cords on its base, tip smooth. Uniformly whitish to very light brown. Rachidian *radular tooth* with a long central cusp, occasionally small lateral folds, 2 small lateral cusps and 1 or 2 marginal cusps or folds. Sickle shaped lateral teeth.

REMARKS. — *Conchatalos tivardi* apparently lives further south and at greater depths than the related species *C. lacrima*. It is sympatric with *Leptotrophon bernadettiae* and *L. charcoti*.

*Conchatalos canalibrevis* sp. nov.

Figs 84-85, 132-133

TYPE MATERIAL. — Holotype and 2 paratypes lv MNHN.

TYPE LOCALITY. — New Caledonia, CHALCAL 2, stn DW 76, 23°41' S, 167°45' E, 470 m.

MATERIAL EXAMINED. — Only known from the type material.

DISTRIBUTION. — Only known from the type locality, recorded alive.

DESCRIPTION. — *Shell* up to 5.9 mm in length, lightly built. Spire high with 1.5 protoconch whorls and up to 4, broad, convex teleoconch whorls. *Protoconch* whorls rounded, smooth, glossy; terminal varix low, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of rounded, high varices. First whorl with 9 or 10 varices, second with 9 varices, third and last whorl with 8 varices. Other axial sculpture consisting of numerous growth striae. Spiral sculpture consisting of very weak cords, ending as small knobs on

varices: 2 on first and second whorl, 3 on third whorl, 4-6 on last whorl. Third and last whorls with one spiral cord on shoulder. Other spiral sculpture of numerous spiral striae. Aperture ovate. Columellar lip flaring, smooth, rim partially erect, weakly adherent at adapical extremity. Anal notch shallow, broad. Outer lip erect, smooth, with a small node within abapically. Siphonal canal short, narrow, abaperturally bent, open, smooth. Pale brown. *Radula* unknown.

REMARKS. — A very small species, also with only 4 teleoconch whorls. It is sympatric with *Leptotrophon metivieri* sp. nov.

ETYMOLOGY. — Named for the short siphonal canal.

*Conchatalos raubani* sp. nov.

Figs 27, 83, 130-131

TYPE MATERIAL. — Holotype and 3 paratypes MNHN.

TYPE LOCALITY. — New Caledonia, MUSORSTOM 4, stn DW 222, 22°58' S, 167°33' E, 410-440 m.

MATERIAL EXAMINED. — **New Caledonia**. MUSORSTOM 4: stn DW 222, 22°58' S, 167°33' E, 410-440 m, 1 lv, 1 dd (holotype and paratype). — Stn DW 234, 22°15' S, 167°08' E, 350-365 m, 2 lv (paratypes).

DISTRIBUTION. — Southern New Caledonia, 350-440 m; recorded alive.

DESCRIPTION. — *Shell* up to 11.9 mm in length, heavy. Spire high with 1.5 protoconch whorls and up to 5 broad, weakly shouldered teleoconch whorls. *Protoconch* whorls rounded, minutely striated; terminal varix low, thin. *Teleoconch* suture impressed. Axial sculpture consisting of weakly angulate, spineless, axial ribs. First whorl with 10 ribs, second to fourth whorls with 8 ribs, last whorl with 7 ribs. Other axial sculpture of numerous, fine growth striae. Spiral sculpture consisting of narrow, weak cords: 2 on first and second whorl, 2 or 3 on third and fourth whorl, last whorl with 8 or 9 cords, including 2 on shoulder. Numerous, very weak striae over whole surface. Aperture ovate. Columellar

lip flaring, smooth, except small node abapically, rim partially erect, weakly adherent at adapical extremity. Anal notch shallow, broad. Outer lip smooth, with a single abapical node within. Siphonal canal short, narrow, straight, narrowly open, with shallow spiral cords. White or light brown with small, pale orange blotches on penultimate and last whorls, on shoulder, between each pair of varices. Rachidian *radular tooth* with a broad, long, central cusp, small lateral denticles and medium-sized lateral cusps, marginal cusps reduced to some folds. Lateral teeth sickle shaped.

REMARKS. — *Conchatalos raubani* lives sympatrically with *Leptotrophon spinacutus*, *L. acerapex*, and *L. bernadettae*.

ETYMOLOGY. — Named after the R.V. "Vauban".

Genus *Apixystus* Iredale, 1929*Apixystus* Iredale, 1929: 185. Type species (OD): *Trophon stimuleus* Hedley, 1907. Recent, New South Wales, Australia.REMARKS. — The shell in *Apixystus* differs from that in *Trophonopsis*, *Leptotrophon* and *Conchatalos* in being smaller, more globose, with a shorter siphonal canal and a more rounded aperture. The radula of *A. leptos* sp. nov. is distinct from those of the species of hereabove genera in having weaker, more crowded, cusps on the rachidian tooth.*Apixystus leptos* sp. nov.

Figs 28-29, 86-89, 134-136

TYPE MATERIAL. — Holotype and 3 paratypes MNHN.

TYPE LOCALITY. — Coral Sea, MUSORSTOM 5, stn DW 346, 19°40' S, 158°27' E, 245-252 m.

MATERIAL EXAMINED. — **Australia**. Masthead Is, Capricorn Group, Queensland, 23°32' S, 151°45' E, 31-37 m, 1 dd (AMS C21787). — 3 km NE of N side of Gillett Bay, Swains Reef, S Barrier Reef, Queensland, 64-73 m, 2 dd (AMS C150077).

**Chesterfield Islands.** MUSORSTOM 5: stn DW 346, 19°40' S, 158°27' E, 245-252 m, 4 lv (holotype and paratypes).

**DISTRIBUTION.** — South Queensland, Australia to Chesterfield Reefs, in 31-252 m; recorded alive in 245-252 m (Chesterfield Reefs).

**DESCRIPTION.** — *Shell* up to 4.9 mm in length (AMS C150077), spinose, delicate. Spire high with 1.75 protoconch whorls and up to 4 angulate, shouldered, spinose teleoconch whorls. *Protoconch* acuminate, strongly keeled, whorls smooth, glossy; terminal varix erect, delicate, thin. *Teleoconch* suture impressed. Axial sculpture consisting of sharp, erect lamellae. First whorl with 10 or 11 lamellae, second and third whorl with 11 lamellae, last whorl with 10 or 11 lamellae. Spiral sculpture consisting of weak, rounded cords:

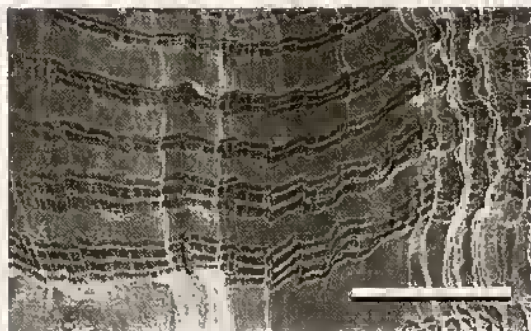
2 on first to third whorls, 3 or 4 on last whorl. Aperture rounded. Columellar lip flaring, smooth, partially erect, weakly adherent at adapical extremity. Anal notch obsolete. Outer apertural lip smooth, with 5 strong, elongate denticles within. Siphonal canal short to medium-sized, narrow, weakly abaxially bent, open, smooth. Translucent milky-white with traces of pale brown on last teleoconch whorl. Rachidian *radular tooth* with long central and marginal cusps, and short lateral denticles. Lateral teeth sickle shaped.

**REMARKS.** — *Apixystus stimuleus* (Hedley, 1907) is smaller with fewer axial lamellae on the first and second teleoconch whorls, and is less spinose, with a rounded rather than acute and keeled protoconch. There are no denticles in the inner side of the outer apertural lip as in *A. leptos* sp. nov. One specimen (AMS C21787) from the Capricorn Group and two from Swains Reefs, Queensland (AMS C150077), formerly identified as *Apixystus stimuleus* are here considered to represent *A. leptos* sp. nov.

**ETYMOLOGY.** — *Leptos* (Greek) = thin, delicate.

#### Genus *LITIZAMIA* Iredale, 1929

*Litozamia* Iredale, 1929: 185. Type species (OD): *Peristernia rudolphi* Brazier, 1894. Recent, southern Tasmania.



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FIG. 79. — *Litozamia tropis* sp. nov., detail of shell sculpture, holotype. Scale bar: 100  $\mu$ m.

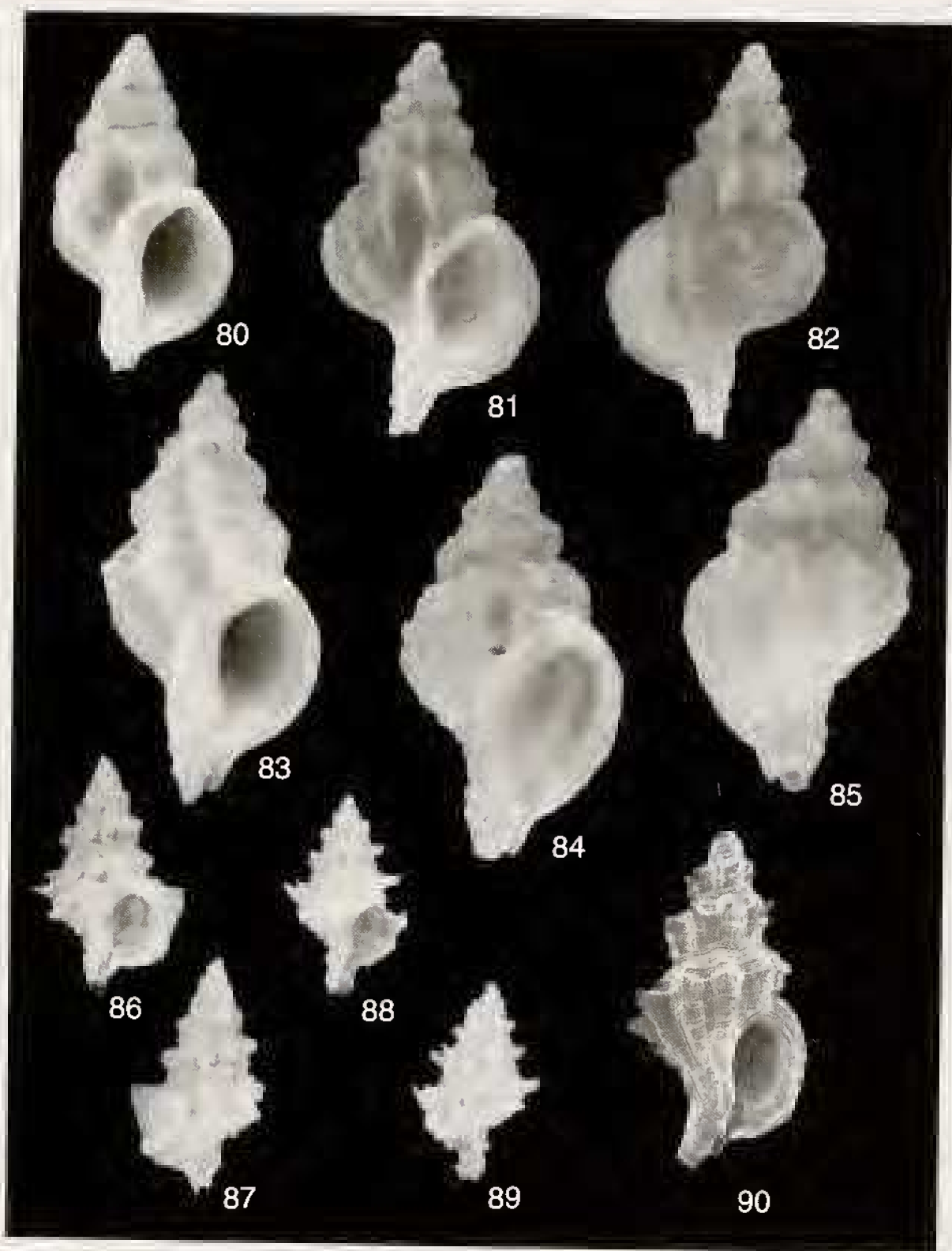
#### *Litozamia tropis* sp. nov.

Figs 79, 90, 141-142

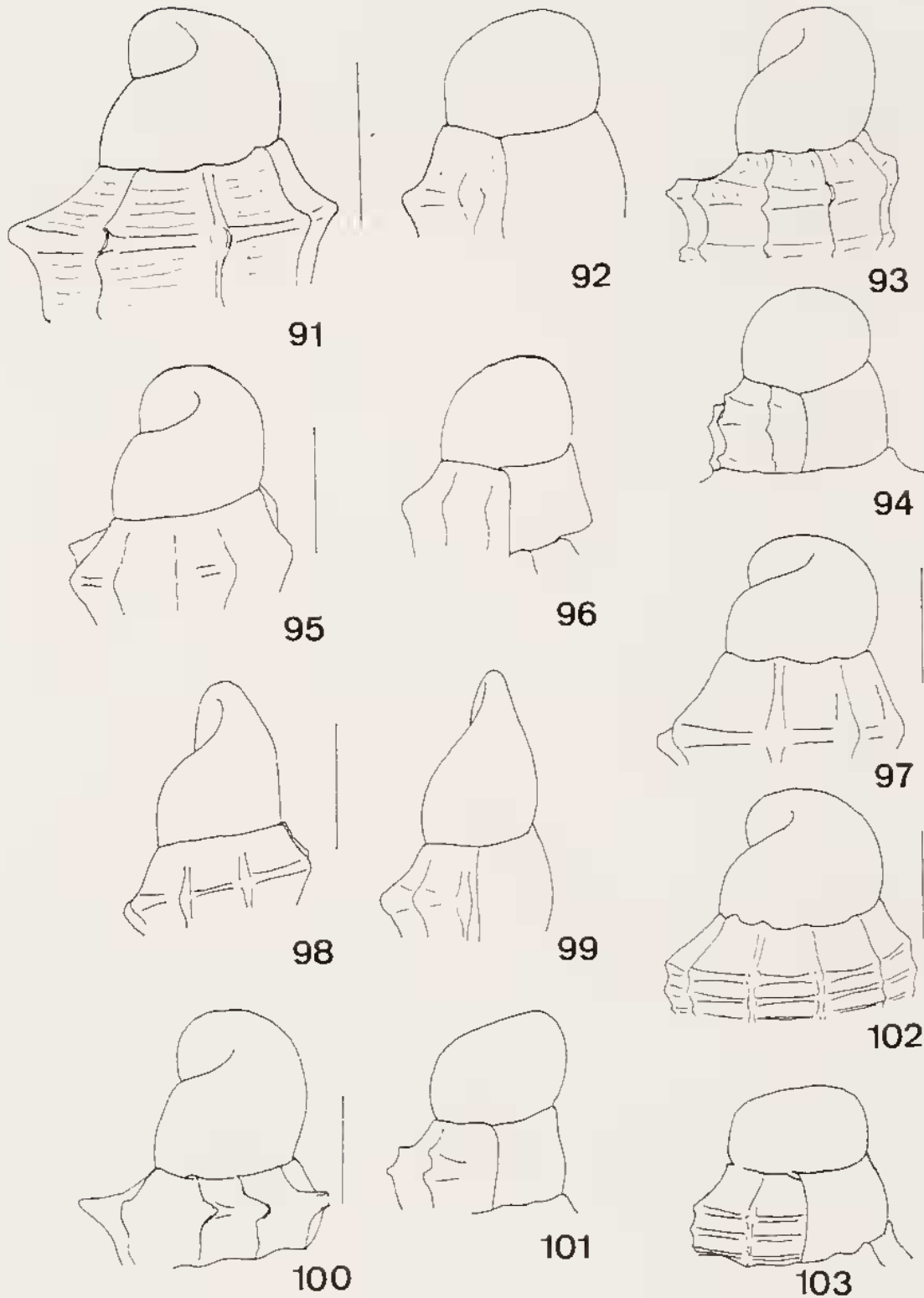
**TYPE MATERIAL.** — Holotype dd MNHN. Paratypes dd: 26 MNHN, 2 AMS C301333, 2 NMNZ M262678, 2 NMP L1163/T1198, 2 USNM 860397, 2 RH.

**TYPE LOCALITY.** — New Caledonia, LAGON, stn 830, 20°49' S, 165°19' E, 105-110 m.

**MATERIAL EXAMINED.** — Only known from the type material.

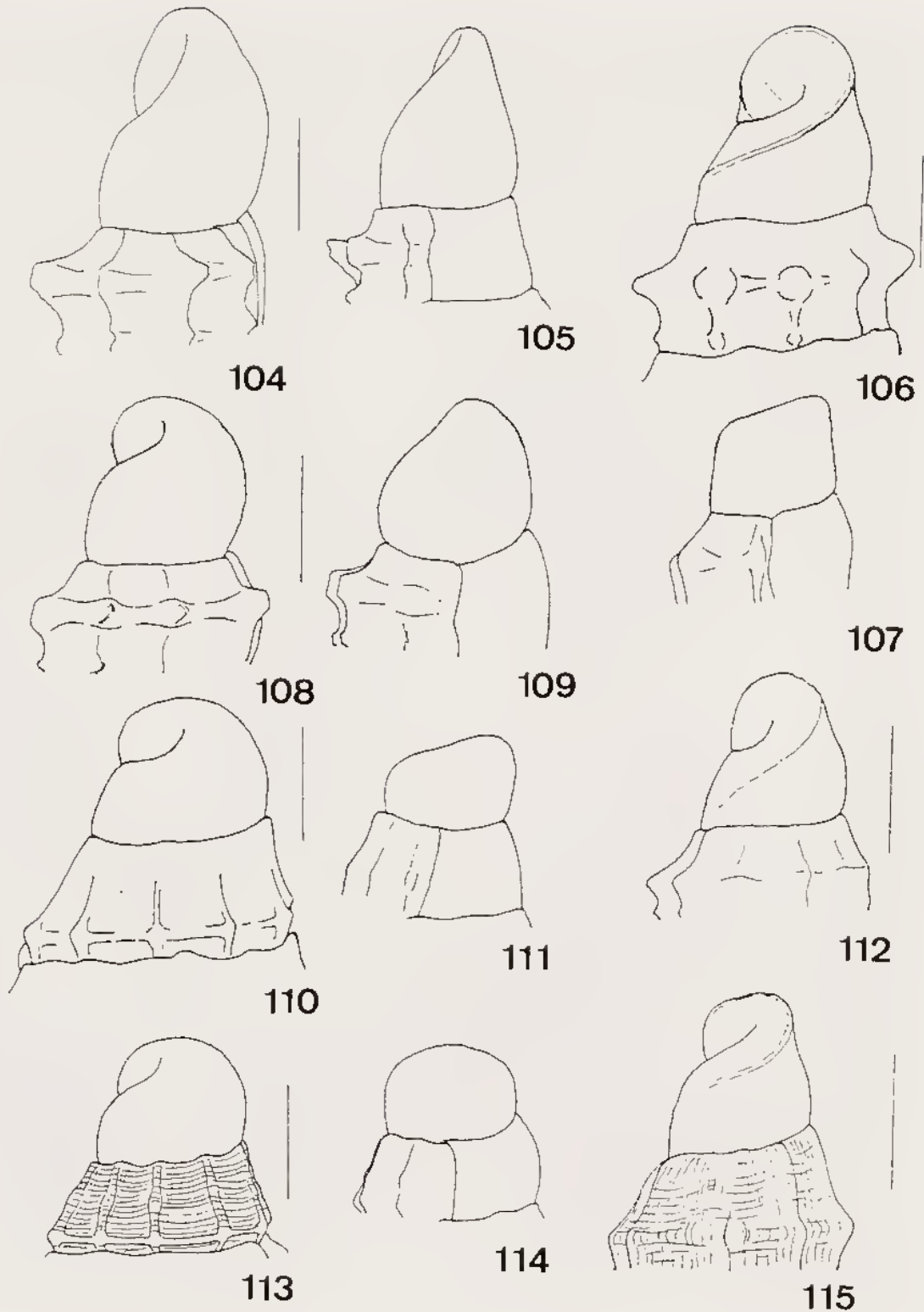


Figs 80-90. — Genera *Conchatalos*, *Apixystus* and *Litozomia*. — 80, *Conchatalos lacrima*, holotype, 9 mm. — 81-82, *C. tirardi*, holotype, 13 mm. — 83, *C. vaubani* sp. nov., holotype, 10.5 mm. — 84-85, *C. canalibrevis* sp. nov., holotype, 5.9 mm. — 86-89, *Apixystus leptos* sp. nov. — 86-87, holotype, 4.7 mm. — 88-89, paratype, MUSORSTOM 5: sin 346, 3.9 mm. — 90, *Litozomia tropis* sp. nov., holotype, 3.3 mm.

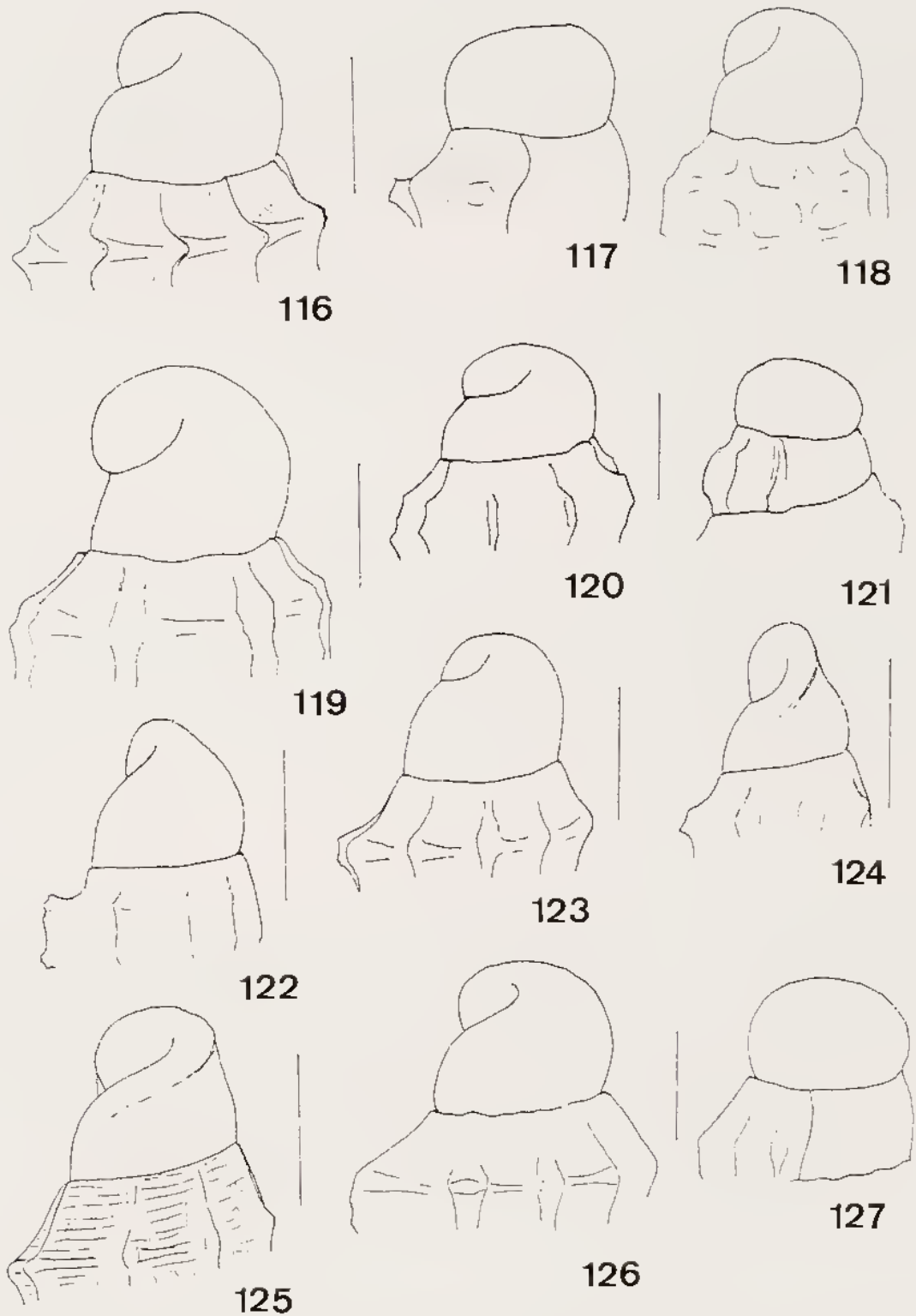


FIGS 91-103. Protoconchs. — 91-92, *Leptitrophon caroue* sp. nov. — 93-94, *L. levii* sp. nov. — 95-96, *L. spinarutus*.  
 97, *L. rutedonicus* sp. nov. — 98-99, *L. acerapex*. — 100-101, *L. rigidus* sp. nov. — 102-103, *L. lineorugosus* sp. nov.  
 Scale lines 0.5 mm.

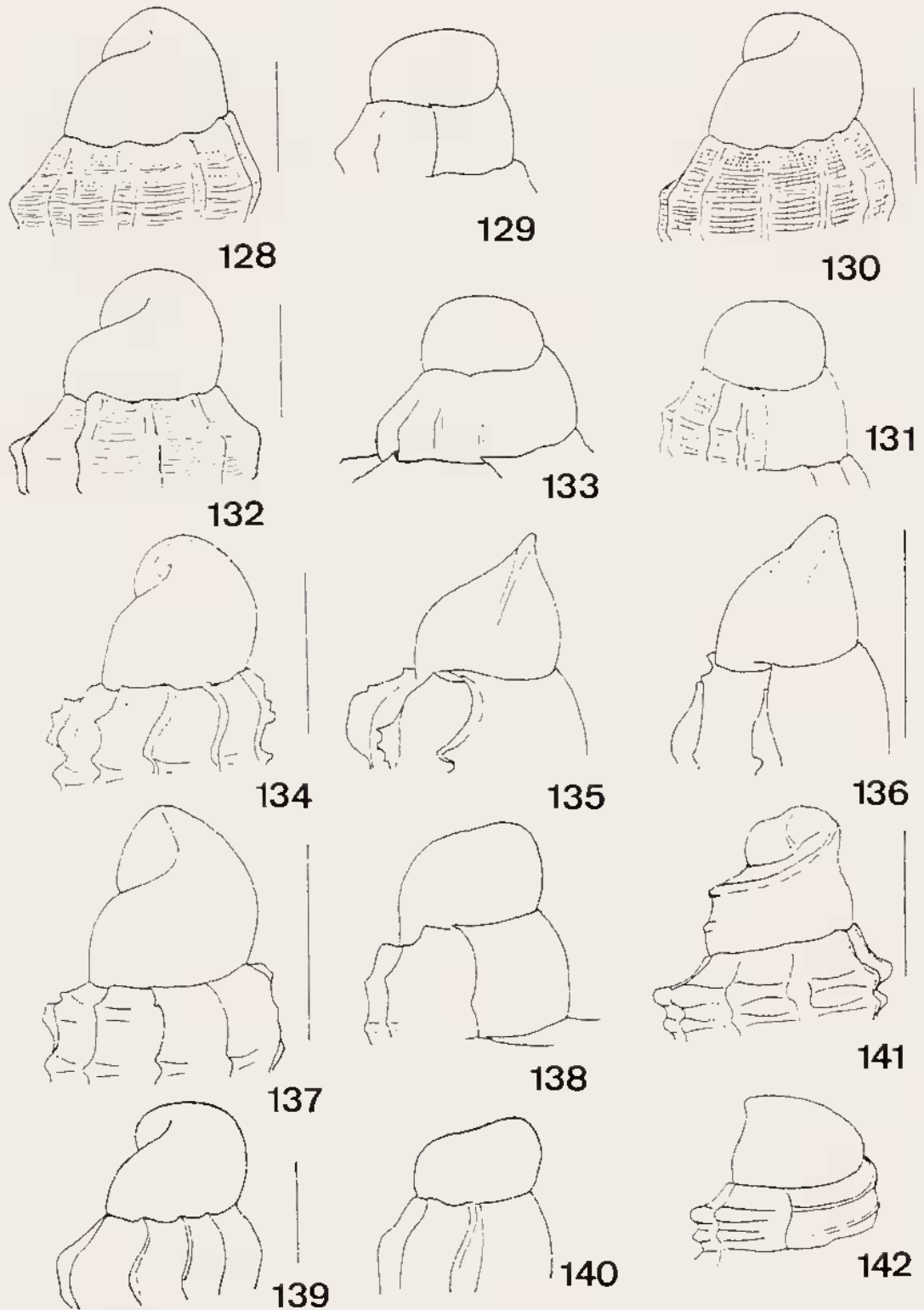




Figs 104-115. — Protoconchs. — 104-105, *Leptotrophon bernadettæ* sp. nov. — 106-107, *L. protocarinatus* sp. nov. — 108-109, *L. charcoti* sp. nov. — 110-111, *L. surprisensis* sp. nov. — 112, *L. virginiae* sp. nov. — 113-114, *L. marshalli* sp. nov. — 115, *L. inaequalis* sp. nov. Scale lines 0.5 mm.



FIGS 116-127. — Protoconchs. — 116-117, *Leptotrophon coriolis* sp. nov. — 118, *L. richeri* sp. nov. — 119, *L. unisorstomae* sp. nov. — 120-121, *L. coralensis* sp. nov. — 122, *L. metivieri* sp. nov. — 123, *L. minispinosus* sp. nov. — 124, *L. biocatae* sp. nov. — 125, *L. turritellatus* sp. nov. — 126-127, *Conchatahus tirardi*. Scale lines 0.5 mm.



Figs 128-142. — Protoconchs. — 128-129, *Conchatalos lacrima*. — 130-131, *C. vaubani* sp. nov. — 132-133, *C. canalibrevis* sp. nov. — 134-136, *Apixystus leptas* sp. nov. — 134-135, Holotype. — 136, AMS C21787, Queensland, Australia. — 137-138, *A. stimuleus*, holotype AMS C25787, New South Wales, Australia. — 139-140, *Trophonopsis multigradus*. — 141-142, *Litozamia tropis* sp. nov. Scale lines 0.5 mm.

DISTRIBUTION. — Only known from the type locality, northeastern New Caledonia, in 110 m; not recorded alive.

DESCRIPTION. — *Shell* up to 3.4 mm in length, spinose. Spire high with 1.5-1.75 protoconch whorls and up to 3 shouldered teleoconch whorls. *Protoconch* dull, sculptured with 2 spiral keels, abapical keel low and weak; terminal varix, shallow, delicate. *Teleoconch* suture impressed. Axial sculpture consisting of heavy rounded, spinose varices. First and second whorls with 8 or 9 varices, last whorl with 6 or 7 varices bearing open, short shoulder spine. Spiral sculpture consisting of low cords, more apparent on varices: 2 on first

and second whorl, 3 or 4 on last whorl. Other spiral sculpture of numerous threads between each pair of cords. 1 cord and numerous threads on shoulder. Aperture ovate. Columellar lip smooth, rim completely adherent. Anal notch shallow, narrow, delineated by small node. Outer lip erect, smooth, weakly lirate for short distance within. Siphonal canal short, narrow, abaperturally bent, narrowly open, with 2 or 3 spiral cords and numerous threads. Beige. *Radula* unknown.

REMARKS. — *Litozamia tropis* differs from *L. rudolphi* (Brazier, 1894) in its double keel on the protoconch, and in having spirally striate, more strongly shouldered and spiny shell. The protoconch in both species have the same number of whorls, but that in *L. tropis* is about half the size.

ETYMOLOGY. — *Tropis* (Greek) = keel.

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